THE GAS JOURNAL

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A Glance at the Contents—

Institution of Gas Engineers.

The Provisional Programme arranged for the 69th Annual Meeting of the Institution, which will take place from June 7 to 10, is published on p. 309.

Examination Questions.

We publish the questions which were set in the Examinations in Gas Engineering and Gas Supply, held on April 30 and May 7 respectively, under the Education Scheme of the Institution of Gas Engineers. [p. 323.]

Unaccounted-for Gas.

In a paper before the Eastern Counties Gas Managers' Association Mr. A. T. Gilbert dealt with the subject of meters and their relation to unaccounted-for gas. He emphasized the advantages of *in situ* meter testing and the necessity for installing meters of adequate capacity. [p. 332.]

The Prince of Wales Opens Coke Oven Plant.

The new £1,000,000 Koppers coke oven installation at the Beckton Works of the Gas Light and Coke Company was formally opened by H.R.H. the Prince of Wales on May 3; and a full description of the plant and the interest which His Royal Highness displayed in it and other sections of the gas-works is dealt with to-day on p. 313.

National Gas Council.

The annual meeting of the South-Western District Executive Board of the National Gas Council was held in Exeter, under the Chairmanship of Mr. Robert Bruford. [p. 310.]

An Exhibition in Cornwall.

The Truro Gas Company had an attractive exhibit at the County Health and Ideal Home Exhibition recently held at Truro. Photographs of the stand are reproduced on p. 311.

Gas Undertakers' Powers of Investment.

A Joint Committee of both Houses of Parliament sat on Thursday and Friday of last week to consider the problem of the powers which gas undertakers should have in regard to the investment of their capital in the securities of other companies. [p. 317.]

400 B.Th.U.'s?

The production (with special reference to complete gasification) and distribution of gas such as is supplied at a calorific value of 400 B.Th.U. at the South Bank Gas-Works are dealt with in a paper by Mr. R. H. Duxbury before the North of England Gas Managers' Association. [p. 325.]

Forthcoming Engagements

May 13.—INSTITUTION OF GAS ENGINEERS.—Joint Research Committee of the Institution and Leeds University, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

May 14.—SCOTTISH JUNIOR ASSOCIATION (EASTERN DISTRICT).—Annual General Meeting in Edinburgh.

May 26.—SOCIETY OF BRITISH GAS INDUSTRIES.—Meeting of Council in the morning, 56, Victoria Street, S.W. 1.

May 26.—SOCIETY OF BRITISH GAS INDUSTRIES.—General Meeting in London.

May 26.—WALES AND MONMOUTHSHIRE ASSOCIATION.—Meeting at Swansea.

June 6.—INSTITUTION OF GAS ENGINEERS.—Meetings of Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee, 3 p.m.; Council, 4 p.m.; 28, Grosvenor Gardens, S.W. 1.

June 7-9.—INSTITUTION OF GAS ENGINEERS.—General Meeting in London.

June 14.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board, 28, Grosvenor Gardens, S.W. 1.

June 24.—WAVERLEY ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Edinburgh.

Sept. 8.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Ayr.

EDITORIAL NOTES

The Prince at Beckton

TUESDAY of last week was noteworthy not only for the Gas Light and Coke Company but for the Gas Industry as a whole. On that day the Prince of Wales honoured the Company and the Industry by formally opening a £1,000,000 battery of coke ovens at Beckton—the largest gas-works in the world. The Prince's visit constituted yet another example of the sympathetic interest taken by the Royal Family in a great and growing British Industry, for many of our readers will recollect that six years ago the coal-handling plant at the same works—the largest plant of its type in Europe—was inaugurated by the King and the Queen, that in the same year the Duchess of York opened the Kensington Showrooms of the Company, and that a few years previously, in 1922, the Duke of York visited the Beckton Works.

Without fuss or trepidation a new carbonizing unit—the only one of its kind in operation on a town-gas-works in this country, and possessing many unusual features—has been brought into operation capable of producing every day from 1200 tons of coal 15 million c.ft. of gas, which represents only a small proportion of the daily output of the Beckton Works, and the lay-out of the plant will permit the extension of the installation to four times the present capacity. And the Gas Industry is supposed to be dying. Surely a highly original swan song!

Book Your Dates

HAVING just returned refreshed from a few days' sojourn on the East Coast, the writer is prepared to assert, with all the force at his command, that June will not be worse than May, so far as weather is concerned. And think how much better it may be! Reflect upon the glorious meteorological conditions by which so many previous meetings of the Institution of Gas Engineers have been favoured—and then picture to yourselves what Hyde Park may look like in the first blush of a fine June morning. Really, the weather must improve by then, and if it does, this entrancing prospect is yours, with much more besides, if you will but promptly book your dates. Do not wait to see which way "the weather is going to jump" before making your reservations, for then you may be too late, and in any case you will miss the cream. In the notices sent out for the Sixty-Ninth Annual General Meeting of the Institution—to be held on June 7, 8, 9, and 10—the enthusiastic Secretary, Mr. J. R. W. Alexander, has done everything, with the exception of filling in your acceptances and cheques.

The programme, which is reproduced in this issue of the "JOURNAL," tells you that the business of the Association will take place in the Hotel where the social functions are to be held, instead of, as hitherto, in the building of a kindred professional body. That is to say, in the Park Lane Hotel, Piccadilly—where last year's brilliant reception was staged. It will be realized that, by this means, the activities of the meeting will be centralized in a convenient place, which should contribute to the amenities of members and facilitate the organization of the meeting.

The half-dozen authors who—in addition to Mr. J. H. Canning, who will deliver his Presidential Address—will appear on the platform are masters of the subjects which they have taken for their papers, and there will be ample time provided for discussion. This, indeed, should be regarded as a *sine qua non* of such meetings, and in the past we have frequently deplored the fact that the guillotine has so often had to be employed upon this most valuable feature of the proceedings, owing to the exigencies of time. As to whether or not the expression of our views in the past on this subject has had anything to do with bringing about the innovation which we understand is to mark this year's meeting, there is no need to stop to inquire. Always we have at heart the utmost good of the Industry which we serve, and no claim we might make could be higher than this. And now to the point—which is that, instead of the customary introduction by the author of his paper, which in some cases has restricted the time allocated to the discussions, a one-thousand-word summary previously prepared will be read by the author or the Secretary, after which the discussion will commence and will be terminated so as to allow a reasonable amount of time for the author's verbal reply, should he desire to give one. It is customary for the author to make a written reply, which is published, to the verbal and written contributions to the discussion. It is hoped that this procedure, together with the circulation of the papers in advance of the meeting, will encourage members to come prepared to participate in the discussions.

Apart from the technical aspect, the meeting promises to be outstanding on its social side. The arrangements made are such as to ensure a large attendance of ladies, without whom the Institution Meeting would lose more than half its charm, and no doubt a substantial part of its usefulness. The Sussex Tour—with the Hastings and St. Leonards Gas Company, Mr. C. F. Botley and Miss C. M. Botley as hosts, and with the great care that has been bestowed on its planning—is brimful of promise. So here's to a bumper gathering!

Complete Gasification

DURING recent years the tendency of gas undertakings, in revising or fixing their declared calorific values, has been towards higher values. This was set out very clearly by Mr. W. J. A. Butterfield in the paper, "Ten Years of the Therm," which he read at the Joint Gas Conference at the British Industries Fair this year, and which was published in the "JOURNAL" for March 2. He showed that during the past ten years, in respect of all the original declarations below 470 B.Th.U., there has been a net loss of 37 with a corresponding gain to declarations of 470 and upwards; and the increase in the number of undertakings subscribing to 500 B.Th.U. is very marked. This upward movement is significant, and is not in support of the contentions of Mr. R. H. Duxbury, whose contribution at last Friday's meeting of the North of England Gas Managers' Association appears in our pages to-day, and who feels that the Gas Industry is "still too largely governed by the old practices which were developed for the production of gas to suit flat-flame burners." In spite of the tendency towards higher calorific values, however, Mr. Duxbury's ardent advocacy of complete gasification is most welcome, for the development of this process undoubtedly strengthens the hand of the Industry to face a possible future situation where residual markets are wholly adverse.

We say "possible" advisedly, because we do not share the view of the author that, when trade and industrial conditions improve, the revenue from coke must suffer. Mr. Duxbury's point is that the market for gas-works coke will suffer when coke ovens of modern pattern are again in full operation. Our point is that there exists a potential market for domestic coke of which the Gas

Industry is only on the fringe at present, but which can be gained if everything is done now to put our house in order to meet a demand which is certain to increase for a satisfactory solid smokeless fuel. Take Stockton-on-Tees to exemplify our argument. During the past few years of trade stagnation on Tees-side there has been a large accumulation of coke at the gas-works, and in spite of shipment of coke abroad at prices considered unprofitable, five months ago there was a stock of over 7000 tons at the works. The whole position has, however, been transformed by the installation of screening and grading plant. Attention to coke preparation has, in fact, created such a demand locally that not only have all stocks become exhausted, but the gas-works cannot produce sufficient coke to meet even the local domestic demand.

At the same time, complete gasification must be considered closely, and its adoption may well be a sound practical proposition in certain circumstances—as, indeed, has been proved. And it must be admitted that the automatic complete gasification plant of to-day is a very different thing from the manually operated units erected either during, or shortly after the end of, the war. Those units did excellent service, but they did not put complete gasification in the best light; and any comparison between this type of gas-making and other systems must be based on plants of to-day. Complete gasification certainly gives control of the coke market, and the blow-and-run process is not the only method. To this point attention was drawn in the "JOURNAL" for March 30 last.

Uniformity the Aim

WE are in complete agreement with Mr. Duxbury's statements on uniformity of gas supply. Provided with properly adjusted appliances the consumer is not concerned whether his gas is 500 B.Th.U. or 400 B.Th.U., if he is always assured of a plentiful supply of gas of uniform composition at adequate and uniform pressure. Modern complete gasification plants are fully capable of yielding a gas low in inerts and of constant composition. In the past complete gasification was both used and abused. Too frequently it was operated either as a balancer of the coke market or to meet peak loads; and we had accordingly wide variation in the composition of the gas supplied throughout the twenty-four hours, stratification, and so on. It is obvious that Mr. Duxbury allows none of these abuses; he supplies a gas of low calorific value, it is true, but the supply is uniform, the gas contains a very small percentage of "inerts," and both he and his consumers are happy. But it does not follow from his remarks that uniform gas of a higher calorific value would, similarly supplied, prove any the less acceptable to the consumer; and we are brought back to the fundamental problem of the price at which a definite number of heat units in the form of gas can be supplied satisfactorily at the consumers' burners, taking all factors into consideration. These factors are of two kinds, distribution and production. Regarding the latter, the author, basing his figures on the plant installed at South Bank and on a yearly production of 532,000 therms per annum, advances the following costs of the therm into holder: With horizontals, 4·244d.; with a Tully plant fitted with waste-heat boiler, and carburetting to 400 B.Th.U. per c.ft., 2·651d. These figures are exclusive of capital costs, and the difference between the costs of the therm into holder is both remarkable and unusual, the major influences being maintenance and labour costs and the high net cost of coal per therm with horizontals.

Mr. Duxbury does mention that horizontals have much more flexibility than have complete gasification plants in regard to choice of coal, but he expresses his belief that it pays to carbonize good coal, irrespective of the type of plant. It would be interesting, he suggests, if some undertaking at present using a poor-grade slack coal would take a supply of good, suitable coal for twelve months, and draw up a balance-sheet of the results. He is convinced that this would show that far too much is made of low coal costs. As for distribution troubles, he has experienced none; but in any discussion on the cost of the complete gasification therm as supplied, the fact that a greater volume of gas has to be distributed to do the same amount of work as a smaller volume of gas of the calorific value normally supplied cannot be lightly dismissed. And apart from the lowered capacity of the distributing mains and services, the holder capacity (one of the great advantages of the Gas Industry) is in like measure diminished. Again, either the work of existing meters is proportionately increased, or meters of higher capacity must be installed. Both these facts are not referred to by the author, who puts forward complete gasification as "ideal carbonization for small and medium-sized works." Whatever our readers' views on complete gasification, however, no one can disagree with the author's remarks on pressure conditions on the district, and we would call attention to his suggestion that a service governor might well be an integral part of every distribution system. In this connection he asks why a built-in governor cannot be included as part and parcel of the meter.

Watch Those Escapes

MORE jargon is talked about unaccounted-for gas than about any other august subject with which our Industry is either faced or deals; and though on some points we cannot wholly agree with the paper by Mr. A. T. Gilbert before the Eastern Counties Gas Managers' Association published in our issue to-day, we are in complete agreement that both the Industry and meter leathers are at fault. Temperature corrections in regard to the gas measured (*a*) at the works and (*b*) at the consumers' meters are comparatively an innovation; distribution of gas approximately to the declared calorific value is a new move, though a true move. And these things together, we suggest, dissipate more than the 1 p.ct. "unaccounted-for" mentioned by Mr. Gilbert. On the other hand, the author has no word to say in praise of the most assiduous gas manager in an area where coal—or any other mineral—is almost pulled from beneath his gas mains and where even a very naughty meter indeed is at times comparatively of minor consequence.

But Mr. Gilbert is undoubtedly right when he suggests that, as gas suppliers, we overload our meters abominably, and yet expect accurate registration. The remedy for unregistered gas is in our own hands: We must (*a*) install meters which are capable of coping with the demands made upon them; (*b*) see that they are good meters; and (*c*) ensure that their accuracy is not impaired by use. The author is all for *in situ* testing, which we believe to be a good policy, because it is a check not only on old meters but also on new ones. It is a fact that meter leathers fail seemingly unaccountably after one or many years' service, and that technicians get busy on the type of gas supplied—whether it is dried, or "oily," or "benzole extracted," and so on. *In situ* testing would assist in the solution of many complex problems of this type.

Mr. Gilbert's paper is surely a plea for co-operation between manufacturer and user. Without co-operation accurate registration of gas will remain a problem of which the solution is really at hand. Every time a gas undertaking installs a meter inadequate to the demands placed upon it, the meter manufacturer is at once unfairly handicapped and the undertaking's profits are prejudiced; conversely, when a gas undertaking installs a meter of adequate size, it has a right to expect appropriate performance. And the lecture by Mr. Gilbert was almost coincident with the paper on complete gasification to which reference has already been made. The gas meter is a volume measuring device, whether it be the positive pattern of which Mr. Gilbert speaks, or of the orifice plate or venturi type, or a meter which relies on temperature rise. If the positive type is just adequate to measure therms in a volume of gas having a calorific value of, say, 500 B.Th.U., what will be the effect of supplying a gas of 350 B.Th.U.? Apart entirely from this, however, we think our readers will agree that the figures of "unaccounted-for gas" could be greatly reduced, much to the profit of both gas supplier and gas meter manufacturer.

PERSONAL

Mr. WALTER T. DUNN, M.I.Mech.E., F.C.I.S., who was formally the Secretary to the Institution of Gas Engineers, has been elected a member of the General Committee of the National Liberal Club, London.

Mr. ERNEST H. LEEDER, Chairman of the Swansea Gas Company, has accepted the Chairmanship of the Swansea Press, Ltd.

Mr. FERNAND DUPONT, Superintendent Engineer at the Neath Gas-Works, has been appointed to the post of Manager to the Brecon Gas Company. Mr. Dupont was articled to Mr. W. Clark Jackson, Gas Engineer and Manager to the Neath Corporation, and is the third of Mr. Jackson's pupils to gain success in other spheres.

The Birmingham Gas Department announce the following appointments: Mr. G. M. LEWIS, from Showrooms Manager to Controller of Gas Sales; Mr. R. G. MARSH, from Fittings Engineer to Fittings Superintendent; Mr. W. L. S. SPINKS, from Commercial and Technical Assistant to Assistant Fittings Superintendent.

Subject to the confirmation of the City Council, the Nottingham Gas Committee have appointed Mr. ARTHUR COLLARD, Sales Controller to the Birkenhead Gas Department, as Sales Development Assistant. Before going to Birkenhead, Mr. Collard, who is 32 years of age, acquired experience of commercial and publicity work with the Chesterfield Gas Department and with the Rochester, Chatham, and Gillingham Gas Company. There were 80 applicants for the post at Nottingham, which carries a commencing salary of £450 per annum.

Mr. A. B. BRITTON, who for some years has been Engineer at the Swan Village Gas-Works of the Birmingham Undertaking, has been presented with a bureau and two armchairs on the occasion of his leaving the works to take up an appointment as Engineer at the Hinckley works of the Hinckley Urban District Council.

Mr. DAVID YULE, of the Alloa Corporation Gas Department, has been appointed Distribution Superintendent to the South Shields Gas Company. For seven years Mr. Yule has been Lecturer on Gas Supply at the Heriot-Watt College, Edinburgh.

OBITUARY

The death has occurred of Mr. WILLIAM PARLBY, of Hereford, at the age of 83 years. Receiving his early education at Loughborough Grammar School, deceased was afterwards articled as a civil engineer, and spent some of his earlier years practising in the gas engineering branch of his profession in Essex and Buckingham, gaining wide experience in the manufacture of gas and in gas-works construction. He went to Hereford from Sheffield, where he was Assistant Manager at the Gas-Works, in 1884. As Gas Engineer and Manager at Hereford for over 20 years he was responsible for many reforms and improvements. He retired from the post on September 30, 1906, when he was the recipient of handsome gifts from the staff and employees.

Correspondence

The Summer Time Act

SIR,—Since 1907, a controversy has been raging as to the merits of daylight saving, and the sharp divergence of opinion on this question is becoming increasingly apparent.

In the absence of any reliable estimate of the period that is necessary for demonstrating the advantages of the system, it may be asked whether it would not be wiser for this great Nation, a Nation with probably more at stake than any other, to discontinue the scheme for the present.

When, if ever, the "Summer Time" experiment is proved to be an unqualified success in other important countries, then, surely, it will be time enough for us to consider the advisability of reviving the Statute.

"GNOMON."

April 27, 1932.

Oxide Purification

SIR,—I should like to add a few words in regard to your criticism on my paper before the Manchester and District Junior Gas Association ["JOURNAL" for May 4, p. 257].

The intention of the paper was to demonstrate how the activity of oxides, depending as stated on temperature and moisture conditions, would best be maintained in practice, it being felt that this side of the question had not received the attention it deserved.

In order to avoid repetition, emphasis has been laid on the more unusual cases, but a study of purification costs will indicate that the basic principles underlying purification as practised at Colne for the past thirty years are not unsound.

Yours, &c.,
STEWART L. WRIGHT.

Gas-Works, Colne,
May 9, 1932.

REVIEWS

THE "PARLIAMENTARY GAZETTE."

The "Parliamentary Gazette" for April, 1932, makes an interesting booklet, containing as it does a wealth of information concerning the last Parliamentary Session.

Included in the contents are particulars of British Ambassadors and Representatives abroad; columns spoken during the session in both Houses; Committees of Inquiry and Royal Commissions; constituencies and names of members of the House of Commons alphabetically arranged; details of divisions, foreign governments, and Government Departments; the King's Speech; members of the House of Lords alphabetically arranged, with their addresses; New Year Honours; Officers of the two Houses, and Privy Councillors; subjects discussed in both Houses, Time-Table of the House of Commons, unemployment statistics, and questions.

This marks the twenty-seventh year of publication of the "Parliamentary Gazette," which is compiled from official sources by Parliamentary journalists and statisticians. The price is 5s., or a subscription of 20s. for four issues (payable in advance), which entitles subscribers to receive supplements and other information in advance of publication free of charge. The booklet is edited and published by James Howarth (Official Reporting Staff, House of Commons), of 21, Elmfield Mansions, S.W. 17.

"TABLES OF ELECTRICITY UNDERTAKINGS."

The 1932 copy of "Tables of Electricity Undertakings," published by Ernest Benn, Ltd., 154, Fleet Street, E.C. 4, constitutes the 45th consecutive annual issue of this important medium of reference, and its price, as before, is 10s. net.

These Tables were originally published as a supplement to the "Electrician," but they have advanced considerably beyond that stage and are now claimed to represent the most complete available record of statistical information relating to electric power undertakings throughout the world. All the data have been revised by the courtesy of the authorities concerned, and an important new feature is to be found in the 1932 edition. This comprises a reference in the case of most home undertakings as to the control of the frequency of the current in various areas, and this has been incorporated for the benefit of users and manufacturers of electrically synchronized appliances. Particulars of electric power companies in the Union of South Africa have also been included in this edition, and it is hoped in the future to develop a Dominions Section.

"SANDS, CLAYS, AND MINERALS."

This is the title of a new quarterly magazine published by Mr. A. L. Curtis, of Westmoor Laboratory, Chatteris, at at an annual subscription of 5s. (or 1s. 3d. per copy *plus* postage). The magazine has a triple programme. First, it seeks to help British trade by promoting closer co-operation between the various industries. Secondly, it aims at giving practical and reliable knowledge on sands, clays, &c., to manufacturers and other business men into whose industries these materials enter. Lastly, it aims at interesting all those who are in any way concerned with the

minerals which the earth's crust provides for the thousandfold use of mankind.

It is not proposed to stop short at purely commercial considerations. There must be thousands of young men in industry who are eager to learn something about the minerals which enter, more or less, into the industries in which they are engaged. This magazine will give them an opportunity of learning, in an interesting way, about the raw minerals produced in all parts of the world, their properties and application to industry.

The first issue contains a number of interesting articles, amply illustrated, embracing such varied subjects as "Black Diamonds;" "Practical Sampling of Ores and Concentrates;" "Sand in British Industry;" "Slate;" with reference to the industry in Wales; "The Manufacture of Portland Cement;" "Lithographic Abrasives;" "Precious Stones;" "A Simple Way to Analyze Clay;" and "Classification of Economic Minerals."

Articles for the first issue have been contributed by experts, with the idea of stimulating interests in subjects—information on which is generally difficult to obtain—and each issue will deal with a different set of subjects, so as to create a wide interest in "Sands, Clays, and Minerals" as a technical periodical.

CHEMICAL ENGINEERING AND CHEMICAL CATALOGUE.

The reduction in bulk of the Eighth Edition (1932) of the "Chemical Engineering and Chemical Catalogue" is in no way due to any less valuable matter contained therein, but, first, to the use of a specially made book paper which gives 50 p.ct. less bulk than that previously used, and, secondly, owing to the fact that the whole of the standing type of the main index and of the bibliography has been distributed and a vastly improved and highly concentrated index and bibliography compiled.

The present edition, like the previous ones, is published by Messrs. Leonard Hill, Ltd., of 231-232, Strand, W.C. 2, at 10s. (as compared with 15s. last year), and embodies a catalogue of heavy and fine chemicals, raw materials, machinery, plant, and equipment applicable to production industries—standardized, condensed, and cross-indexed. The Editor is Dr. D. M. Newitt, and the volume is compiled with the co-operation of leading British manufacturers.

The index is enlarged almost beyond recognition, and for those who like figures we may state that 3250 odd items are listed—some 15,000 entries in the aggregate. The main index has this year been translated into German, and this now forms a German-English technical dictionary. A foreword to the publication is contributed by Sir Robert Hadfield, Bart., who congratulates the publishers on completing the whole of their programme of expansion. With trading conditions so exacting, he says, great care must be exercised in purchasing, and he commends this new edition as an industrial Thesaurus, stimulating imagination, economizing time, saving money, and encouraging British enterprise.

In conclusion, we may remind our readers that this catalogue is designed as a standard text-book of reference for consulting and contracting engineers, works managers, and others charged with the specification and purchase of the plant, equipment, and material utilized in the manufacture mainly of consumable products; and the publication is therefore not without value to gas interests, referring as it does to a number of well-known manufacturers of plant in the Industry.

69th Annual General Meeting of the Institution of Gas Engineers

PARK LANE HOTEL, LONDON—7th to 10th June, 1932

President: J. HERBERT CANNING, O.B.E., M.Inst.Gas E., F.C.S.

PROVISIONAL PROGRAMME

Tuesday, June 7.

10. 0 a.m.	Opening of the 69th Annual General Meeting at the Park Lane Hotel, Piccadilly, W. 1. Welcome to Representatives from Overseas. Adoption of the 69th Annual Report and Accounts. Presentation of Medals. Presidential Address.
11. 0 a.m. to 12.15 p.m.	Mr. F. M. Birks, O.B.E., M.I.Mech.E., M.Inst.Gas E., Mechanical Engineer, Gas Light and Coke Company, on "The Co-ordination of Power Relative to Gas-Works."
12.30 p.m.	Photograph in Green Park (opposite Park Lane Hotel).
12.45 p.m.	President's Luncheon to the Council in the Tudor Room of the Park Lane Hotel.
3. 0 p.m.	General Meeting of the Benevolent Fund.
3.15 p.m. to 4.30 p.m.	Dr. C. M. Walter, Engineer-in-Charge, Industrial Research Laboratories, Birmingham City Gas Department, on "The Use of Gas as a Fuel in Industry, with Special Reference to Future Applications." Scrutineers' Reports of the Ballots.
9. 0 p.m. to 2. 0 a.m.	Reception and Dance in the Ballroom of the Park Lane Hotel.

Wednesday, June 8.

9.45 a.m. to 6.45 p.m.	Ladies' Visit to and Luncheon and Tea at the Whipsnade Zoological Park, Bedfordshire.
10. 0 a.m. to 11.15 a.m.	Mr. J. E. Blundell, M.Inst.C.E., M.Inst.Gas E., Engineer and Manager, Carlisle Corporation Gas Department, on "Ten Years' Carbonizing in Vertical Retorts."
11.15 a.m. to 12.30 p.m.	Mr. C. A. Masterman, M.A., F.I.C., Senior Chemist, and Mr. T. G. Noble, B.A., Chemist, Gas Light and Coke Company, on "Gas Fire Flues and Ventilation."
12.45 p.m.	Council Luncheon to the President in the Tudor Room of the Park Lane Hotel.
2. 0 p.m. to 6.45 p.m.	Visit by motor coach to and tea (by invitation) at the Beckton Works of the Gas Light and Coke Company.

Thursday, June 9.

10. 0 a.m. to 11.15 a.m.	Dr. J. S. G. Thomas, Senior Physicist, South Metropolitan Gas Company, on "A Method of Analysing Gas Output Curves."
11.15 a.m. to 12.30 p.m.	Mr. W. Clark Jackson, M.Inst.Gas E., A.M.I.Mech.E., Engineer and Manager, Neath Corporation Gas Department, on "The Results of Constructive Policy as Applied to a Small Gas Undertaking."
12.30 p.m. to 12.45 p.m.	Concluding Business of Meeting.
2. 0 p.m. to 6.45 p.m.	(*a*) Visit by motor coach to the Chemical Works and the Metro-Coalite plant of the South Metropolitan Gas Company at East Greenwich, and tea (by invitation) in the Institute. (*b*) Ladies' visit by motor coach to the Royal Naval Museum and the Painted Hall, Greenwich, and tea (by invitation) in the East Greenwich Institute of the South Metropolitan Gas Company.

Friday, June 10.

SUSSEX TOUR (Battle-Hastings-Rye-Bodiam-Tunbridge Wells).—Victoria Station (9.20 a.m.) by special train to Battle Station (11 a.m.); motor coach (11.5 a.m.) to visit Battle Abbey (11.10 a.m.); Battle Abbey (12 noon) by motor coach to Queen's Hotel, Hastings (12.20 p.m.), for luncheon (12.30 for 12.45 p.m.) by invitation of the Hastings and St. Leonards Gas Company; Hastings (2.15 p.m.) by motor coach to visit Rye (3 p.m.); Rye (3.30 p.m.) to Bodiam (4.45 p.m.) for visit to Bodiam Castle, and tea by invitation of Mr. C. F. Botley (Hastings) and Miss C. M. Botley; Bodiam (6 p.m.) by motor coach to Tunbridge Wells (7 p.m.); Tunbridge Wells Central Station (7.5 p.m.) by special train to Victoria (8.10 p.m.). Distance: 153 miles (91 by rail, 62 by road). Members not desirous of participating in the motor coach tour to Battle, Rye, Bodiam, and Tunbridge Wells, may arrange to travel to Hastings by the special or any ordinary train on the Friday, and return by any ordinary train (*a*) on the Friday, or (*b*) by payment of a small supplement at Hastings Station, until the following Tuesday night. Members who contemplate remaining in Hastings for the week-end, are informed that the *en pension* terms at the Queen's Hotel are from 18s. to 22s. 6d. per day.

THE NEWS OF THE WEEK

The Kirkcaldy Gas Committee have had under consideration the question of purchasing the Dysart Gas Undertaking. A Sub-Committee of the Town Council has been appointed to go into the proposal.

More than 200 Tenants of Glasgow Corporation houses at Govanhill have asked the Corporation to install gas fires and cookers in place of the existing electric fires and cookers. The cost of this change is estimated at £3800, and it is recommended by a sub-committee that no action be taken by the Corporation.

Gas Driven Buses for Rotherham.—At a recent meeting of the Transport Committee of the Rotherham Corporation the Transport Manager reported on his visit to Paris with the Rolling Stock Superintendent to obtain details with regard to the operation of buses by means of gas stored in high pressure cylinders. He stated that the experiments which had been carried out in Paris during the past two or three years had proved that compressed gas was quite an adequate substitute for petrol. The Committee recommended the conversion of two buses at a cost of about £100 each as an experiment for operation by gas instead of petrol.

Vertical Retorts are to be installed at the Porthcawl Gas-Works. When the matter was discussed in Committee it was suggested that the erection of the retorts would mar the surroundings of the gas-works which lies near Coney Beach—one of the most popular beaches of this seaside resort during summer months. At the suggestion of Mr. W. Clark Jackson, the Manager of the Neath Corporation Gas Department, this has been overcome. The design for the new retort house has introduced architectural beauty, and a square tower of grey stone with mock embattlements, arrow slits, and windows resembling those of the Restoration period, is to be built.

Carnival Party at Hastings.—The centenary of the Hastings Gas Company was celebrated worthily at the White Rock Pavilion on April 29, when between 500 and 600 people attended the Co-Partners' Social Club's carnival party. Among the chief guests were Mr. and Mrs. A. M. Apel, Mr. and Mrs. H. H. Moppett, and Mr. C. F. Botley, and a warm welcome was extended to a party of members of the Eastbourne Gas Company's Social Club. The evening opened with a short concert, and the fancy dress parade followed almost immediately, the judging being carried out by Mr. and Mrs. Apel and Mr. and Mrs. Moppett. Both the ladies were presented with bouquets by Miss Joan Taylor. The prizes were presented by Mr. C. F. Botley, who made a short speech reflecting the spirit of the evening, and the rest of the time was spent in dancing, the Radiation Orchestra, conducted by Mr. H. Bevis, providing the music and Mr. Vic Parker undertaking the duties of M.C. The arrangements for the party were made by Mr. F. J. Hookham (Chairman), Mr. A. G. Taylor (Secretary), and a Committee.

Gas and Electricity Deposits.—At a meeting of the Workington Corporation Finance Committee the Borough Treasurer submitted a report on the general practice of requiring deposits from consumers of gas and electricity and on the local position with regard thereto. After carefully considering the matter the Committee are of the opinion that some modification should be made in the existing practice, and they recommend that the present rule requiring the payment of deposits by all consumers be relaxed so as to allow the Borough Treasurer and the appropriate Engineer to dispense with the payment of a deposit in cases where they are satisfied, after having regard to the financial ability of the consumer, that such payment would not be necessary, and that in order to equalize the position between old consumers who have paid a deposit and new consumers who may not be required to do so, old consumers shall be at liberty to apply for re-payment of their deposits, and, provided the Borough Treasurer and appropriate Engineer are satisfied as to the financial ability of the consumer, such deposits may be repaid.

"Punch" Summer Number.—This is a gay and amusing publication in which, as usual, humorous illustrations largely predominate, many of them being in colour. It contains pictures by nearly all the well-known "Punch" artists. The central double-page displays a most interesting series of pictures by J. H. Dowd, entitled "Brighter Stars," in which he tells us how "In the present World Crisis, which demands increased effort, our film artists have felt it incumbent upon them to go one better than their previous best." The number costs 1s. and is most entertaining. It will be found to be well worth the money.

Gas from Coffee.

We are indebted to Mr. J. Bell, Engineer, Manager, and Secretary to the Dumbarton Gas Department, for several copies of "P. G. & E. Progress"—the house organ of the Pacific Gas and Electric Company.

From one issue we learn that Brazil is experimenting with the manufacture of gas from low grade coffee, which otherwise would be dumped into the sea. "Simon Lopes, former Minister of Agriculture, says that 100 kilogrammes of coffee will produce 36 cub.m. of gas, as compared with 30 cub.m. obtained from a similar quantity of coal."

National Gas Council.

South-Western District Executive Board.

The Annual Meeting of the South-Western District Executive Board of the National Gas Council was held at the Offices of the Exeter Gaslight and Coke Company on April 21—Mr. Robert Bruford, J.P., C.A. (Taunton), in the chair.

The minutes of the last annual meeting were read and confirmed, and the list of elected members was received. The following Officers and Committee were appointed for the ensuing year:

Chairman.—Robert Bruford, J.P., C.A. (Taunton).
Vice-Chairman.—P. S. Hoyte (Devon Gas Association).
Hon. Secretary.—W. J. Imbrie (Yeovil).
Management Committee.—The members of the Committee (see "JOURNAL" for June 17, 1931) were re-elected *en bloc*.

The Hon. Secretary reported the receipt of a letter from Mr. J. H. Ellis intimating that it was his intention to resign office as a member of the Central Executive Board, and it was not his wish to submit himself for re-election.

It was resolved that the Hon. Secretary be instructed to write to Mr. Ellis expressing the great regret of the South-Western District Executive Board at Mr. Ellis' resignation, and placing on record their high appreciation of his services both in the South-West and at Headquarters. The appointment of a successor to Mr. Ellis on the Central Executive Board was left over until a later date.

Mr. W. J. Smith, the Secretary of the National Gas Council, submitted his report of the work accomplished by the Council during the last twelve months.

Gas in Steel Works.

In a discussion on "Smoke Abatement in Industry" at the Monthly Meeting of the London Section of the Society of Chemical Industry, which was held at Burlington House on Monday, May 2, Mr. H. Clifford Armstrong (Messrs. Firth & John Brown, Ltd.) said that as a fuel technologist he was satisfied there was no smoke problem at all, and that it was possible in Sheffield to make a steel without smoke. He did not suggest, however, that this could be done with the existing coal fired furnaces; and the problem was that steel manufacturers could not afford at present to convert their furnaces.

It could be claimed that several firms in Sheffield at the moment had solved quite a number of the problems. For instance, at the present time stainless sheets 4 ft. by 12 ft.

were being made there, for the first time, using gas at 2·4d. per therm, the cost of manufacture being equal to that when coal was used. At the same time, it was not possible to make these sheets economically at the present moment with gas at 2·4d. The point which he urged upon chemists was that they should help in the application of secondary air, for, to all intents and purposes, burning the gas completely. There was undoubtedly much evidence that the addition of cold air was wrong, and that it was necessary to preheat the air. This was a chemical problem rather than an engineering one. The inspectors in Sheffield had been extremely lenient and fully realized that industry was in a bad way at the present time. Speaking generally, concluded Mr. Armstrong, it was time people stopped saying that smoke was necessary in industrial operations, because there was not the slightest need for it. It was largely a question of design and fuel; and if the gas people could give cheaper fuel the problem could be solved.

Merger of Coal Interests.

It is understood that the coal and coke business hitherto conducted by Messrs. Arthur Wharton, Ltd., from their Leeds, Liverpool, Wakefield, and Keighley Offices, has been amalgamated with that of Messrs. G. R. Cawood & Co., Ltd., of Leeds.

In order to give suitable recognition to the extensive interests involved in the merger, the name of the Company is being altered to that of Cawood, Wharton, & Co., Ltd., which concern will be associated with Messrs. Richard Thomas & Co., Ltd., the well-known firm of steel and tinplate manufacturers. Mr. E. W. Towler, who until recently had charge of the inland interests of Messrs. Arthur Wharton, Ltd., will be associated with the joint concern as Managing Director, and the respective staffs will continue as in the past.

The activities of the new Company will be widespread. The Head Offices will be at 1, Cavendish Road, Leeds, and there will be Branch Offices in London, Liverpool, Keighley, and Wakefield. The operations of the two distributing Companies involved in the merger have hitherto been complementary rather than competitive. Messrs. G. R. Cawood & Co., Ltd., have specialized in the wholesale distribution of all kinds of coke on the one hand, and of road-making materials on the other hand—while Messrs. Arthur Wharton, Ltd., have been mainly concerned with coal distribution.

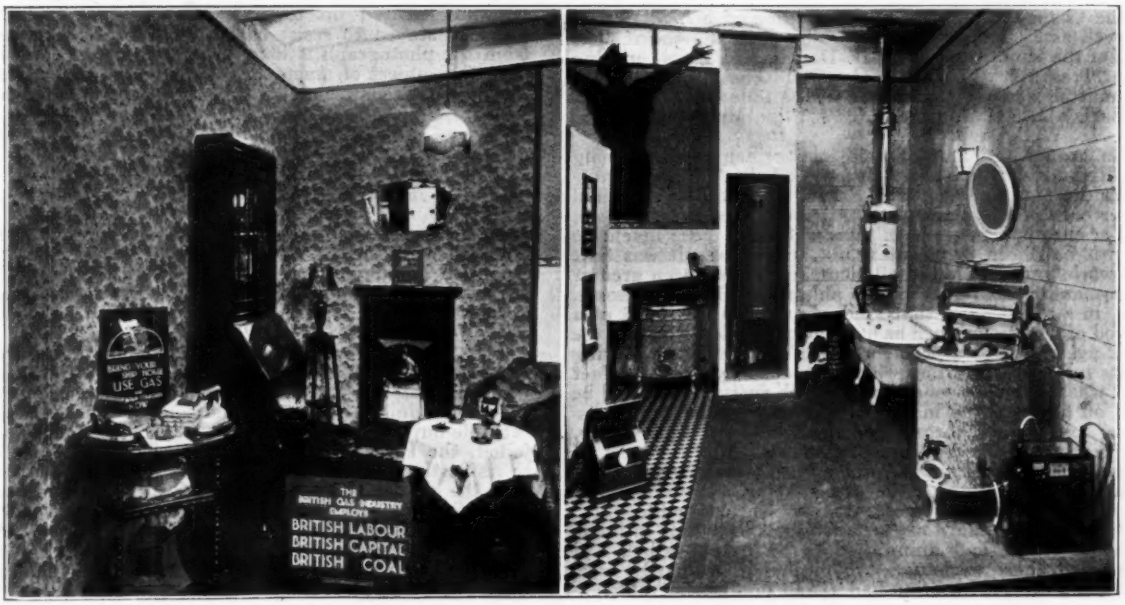
As is well-known, the complicated problem of the reorganization of coal distribution has long engaged the thought and study of the leaders of the various interests concerned—and one of the directions in which reform is tending is towards a reduction in the number of units of distribution by the amalgamation of appropriate interests. The new Company will have the advantage of the experience of Mr. Arthur Wharton, who will become one of its Directors.

The merger so far as Messrs. Arthur Wharton, Ltd., are concerned relates to that part of their inland business conducted at Leeds, Liverpool, Wakefield, and Keighley, but does not affect their exporting or other inland interests either directly or through their associated Company: Arthur Wharton (Northern), Ltd. The new Company's Road Materials Department will be continued and developed under the Directorship of Mr. D. S. Wintersgill, its present chief.

Mr. G. R. Cawood, the Chairman of the new Company, is Chairman of the North of England Coal Traders' Association and President-Elect of the Yorkshire Coal Exchange.

An Exhibition in Cornwall

Three views of the stand of the Truro Gas Company at the County Health and Ideal Home Exhibition recently held at Truro. These photographs were taken by gas light, and the general lighting effects aroused very favourable comments from the public. Large crowds attended the exhibition, and good business has resulted.



THE NEWS—continued.

Lecture to Leeds Distribution Staff.

On the invitation of Mr. C. S. Shapley, Engineer and General Manager of the Leeds Corporation Gas Department, Mr. J. H. Bingham, of George Glover & Co., Ltd., Ranelagh Works, Chelsea, delivered a lecture on "Dry Gas Meters" to a large gathering of distribution and workshops' staff.

Mr. T. Went presided, and the long and interesting discussion which followed the lecture gave ample proof of the interest aroused in this all-important subject.

A hearty vote of thanks, both to Mr. Bingham and Messrs. George Glover & Co., Ltd., terminated the proceedings.

Manchester Juniors at Trafford Park.

On May 4, the Manchester and District Junior Gas Association visited the works of Messrs. Lancashire Dynamo and Crypto, Ltd., Trafford Park, Manchester, where the members were received by Mr. Mason and Mr. Charnley, together with several members of the technical staff, who later conducted the party round the works.

The party were taken through the various departments, and were particularly impressed by the exceedingly good layout of the shops, and the efficient methods of manufacture. The visitors were particularly interested in a special motor for gas-works purposes which is exceedingly robust, fume-proof, and dirt-proof, and will withstand discharges of flame from the retort. The bearings are fitted with a special dust excluder.

After the tour of inspection, the members adjourned to the works canteen for tea, after which Mr. S. L. Wright, of Colne, read a paper, "A Biography of Dry Purification," which appeared in our issue last week.

Messrs. H. Partington (Oldham), S. Carter (Liverpool), G. H. F. Windiate (Stretford), H. C. Applebee (Manchester), J. R. Wood (Farnworth), N. Stockton (Stockport), and C. H. Bamber (Bolton) joined in a discussion on the paper.

Mr. C. H. BAMBER, B.Sc. (Bolton), moved, and Mr. S. CARTER (Liverpool) seconded, a vote of thanks to the firm for their kindness in allowing the visit, and also for the hospitality received.

Mr. MASON (Director) replied on behalf of the firm and the technical staff.

Chemical Engineering Group.

The Annual General Meeting and Annual Dinner of the Chemical Engineering Group of the Society of Chemical Industry was held at the Waldorf Hotel, London, on Friday, April 22—Mr. George Gray (Chairman of the Group) presiding.

The Report of the General Committee stated that the success of the Group during the past year had been remarkable even in face of the high standard which had been set by previous sessions, and probably as the result of such energetic activity the Group was weathering the economic storm in a far better manner than many other institutions of a similar kind.

The Chairman announced the election of Mr. J. Arthur Reavell as Chairman for the ensuing year and the re-election of the Hon. Secretary (Mr. Donald McDonald) and the Hon. Treasurer (Mr. F. A. Greene). The election to the Committee was also announced of the following: Major L. J. Barley, D.S.O., Major H. J. W. Bliss, Mr. George Gray, and Mr. W. Russell.

The Annual Dinner followed, the principal guest being the Right Hon. Sir Robert Horne, G.B.E., M.P., who gave an Address on Currency and Prices. Nature, he said, had never been more bountiful than it was at the present time, and science had never been more active or more inventive than it had been in recent years, and the result was that the world's production of all commodities had been greater than mankind had almost been able previously to conceive. Yet, in a situation of that kind, we were in the midst of a period of depression such as had never been known since the dark ages. It was a problem which was almost paralyzing in its intricacy, and one which stupefied by the very fact that what seemed a condition in which everybody should be well off had resulted in a condition of great hardship, distress, and misery throughout the whole habitable globe. The reason for this condition of things was that the medium of exchange had broken down, and not that over-production had brought about the present state of affairs. The trouble the world had got into was because gold, which had been the standard of exchange for a long time in international trade, had diminished to an extent which had hampered those exchanges which should ordinarily have taken place. The position had arisen to a considerable extent, though not entirely, by the sterilization of gold in France and America. An improvement in our position had been brought about by the fact that we were no longer on the gold standard. The endeavour now should be so to operate sterling as to suit the great area of which this country was the centre; and one of the things which seemed to him of vast importance was that we should not allow sterling to rise so high that other people could not live with us at that level. Keeping sterling at a level which made business easy throughout the world would prevent that enormous speculation which went on when we returned to the gold standard in 1925. He regarded the fact that we are now a protectionist country as giving us an opportunity of doing something to bring down tariffs and take some of the shackles off the commerce of the world. The present system in which every country was condemned to live for itself would bring the whole world to bankruptcy sooner or later.

Gas Lighted Sky Sign.

This photograph is of a sky-sign, which the Isle of Thanet Gas Light and Coke Company have flood-lighted by gas, and which is particularly conspicuous against the skyline.

It is on top of the Company's new showrooms at Cliftonville and is lighted by means of a Foster & Pullen 16-light strip lantern, operated automatically by a time-switch. The over-all size of the sign is 9 ft. wide by 16 ft. high, and it stands 16 ft. away from the lantern, which is immediately behind the parapet wall. The letters are painted white and are cut out of sheet iron, being 2 ft. 6 in. high by 2 ft. wide, and the width of the iron is 4½ in., each letter being separately wired on to a framework of barrel tubing properly stayed to resist wind pressure. As will be seen from the photograph it is a very striking sign; and it has been the subject of much comment in the town, more particularly on moonless nights, when it is especially noticeable.

Nottingham Municipal Boundaries and Gas Supplies.

After proceedings extending over fourteen days, a Select Committee of the House of Commons announced its decision, on Tuesday of last week, regarding the main Clauses of the Bill which had been promoted by the Nottingham Corporation for a wide extension of the City boundaries—see "JOURNAL" for May 4.

The principal opponents of the annexation were the Notts. County Council and local urban district authorities, who raised strong objection to being deprived of independence of administrative control and consequent heavier added rateable burdens. All efforts to effect a compromise having failed, the Private Bill inquiry procedure was protracted to its costly end, with results which were incommensurate with the heavy expenditure incurred by the Corporation.

The Committee found the preamble of the Bill proved as far as it affected the whole of Colwick and portions of other suburban areas, these constituting an addition to the City of 5850 acres, with an additional population of 10,000 and an increased rateable value of £43,000. But

these concessions were small in comparison with the claim which had been originally advanced, the Corporation failing completely to establish its case for the annexation of the two main outside areas desired—West Bridgford and Carlton.

Gas Exhibition at Felixstowe.

An exhibition to illustrate the advantage of using gas in the home was held at Felixstowe last week, the exhibition being opened by Mrs. Rootham, wife of the former Chairman of the Felixstowe Urban District Council. A large audience of women gathered at the Hamilton Hall for the opening, and found a comprehensive display of gas fittings. The exhibition was arranged by the Ipswich and District Gas Company. Mrs. Rootham was welcomed by Mr. G. A. Mallett (the Secretary of the Ipswich Gas Light Company), who was accompanied by the Engineer (Mr. A. W. Sumner).

Mrs. Rootham said that the more they used gas the greater would be the reduction in price, and they were thankful to the Gas Company that they had already reduced the price as far as they could. She welcomed the exhibition because those who attended it would find it interesting and instructive, and she hoped that the exhibition would be a success.

Mr. Mallett said that the Ipswich Gas Company had been amalgamated with the Felixstowe Gas Company, as with the Woodbridge Company, and one of the consequences of that amalgamation was a reduction in the price of gas by 6½d. per 1000 c.ft. Perhaps that did not seem very much, but in the aggregate, taking the gas used during twelve months, it represented a reduction of £2350 per annum. Mr. Mallett recalled the gas cookers which were used years ago as compared with the latest types. The new cookers were much more efficient, and were so well finished that the modern gas cooker was a thing of beauty.

The exhibition included a series of demonstrations daily at 3 p.m. and 7 p.m., by Miss G. Richardson, C.D.S., of Radiation, Ltd., who explained the uses of a modern gas cooking appliance. The Ipswich Gas Light Company arranged the exhibition in conjunction with the Richmonds Gas Stove Company and the Davis Gas Stove Company, and the purpose of the exhibition was to bring before the public the progress which has been made during the last few years in the scientific construction of gas apparatus.

[News continued on p. 335.]

THE PRINCE OF WALES : : AT BECKTON : :

Opening of £1,000,000 battery of coke ovens at Gas Light and Coke Company's Works

THE PRINCE OF WALES INSPECTING THE PLANT.

The new coke ovens, installed by the Gas Light and Coke Company at Beckton, were visited and formally opened on May 3, by H.R.H. the Prince of Wales. The installation is the only one of its kind in operation on a town gas-works in this country.

The plant consists of 60 Koppers twin-flue combination ovens—*i.e.*, for alternative heating with producer or coal gas—and is capable of carbonizing 1200 tons of coal per day. It is equipped with coal and coke handling arrangements and mechanical producers which are housed in a separate building near the ovens. The lay-out of the installation permits the extension to an ultimate capacity of 4800 tons of coal per day.

The coal is supplied from two sources:

(*a*) A belt conveyor leads from the coal-screening plant near the coal unloading pier direct to the coal-crushing plant.

(*b*) The works railway from the overhead viaduct supplies either fresh or stored coal to a line of hoppers of about 200 tons capacity situated below the viaduct.

The coal is fed by roll feeders to a belt which conveys it to the crushing plant.

The coal received in the crushing plant is first freed from extraneous material in a Bradford breaker of 12 ft. dia-

meter, which deals with 200 tons of coal per hour. This serves the double function of cleaner and preliminary breaker. It extracts from the coal tramp iron, wood, rags, and mineral matter, while the coal is broken to 1½ in., by being dropped on to the breaking bars and the heavy perforated steel plates of the revolving drum. After this preliminary treatment, the coal is crushed in one of the two hammer mills each capable of dealing with 100 tons per hour, so that 80 p.ct. of the coal is below ½ in. These mills run at a speed of 725 r.p.m. and require each about 250 h.p. The crushed coal is conveyed to the blending plant consisting of three 200 tons blending bunkers, below which twelve revolving feed tables adjust the rate of delivery to an inclined belt conveyor. This deposits the crushed and blended coal in the central service bunker of 3600 tons capacity (equivalent to three days of the present requirements). The coal is drawn from the bunker through a set of 18 doors into a charging larry which travels on top of the batteries.

The ovens are arranged in two batteries of 30 ovens on either side of the coal service bunker. The ovens have an overall length of 41 ft. 10 in., a height of 14 ft. 1½ in., and an average width of 17¾ in., with a taper of 1⅝ in. from the machine side to the discharging side. Each oven holds a

The Prince of Wales, with Sir David Milne-Watson, acknowledging the cheers of workmen.

charge of about 16 tons, and has thus a throughput of about 20 tons of coal in 24 hours at the normal carbonizing period of 19 hours. The carbonizing period, however, can be varied in accordance with the demand for gas, and the type of coke which is required.

Latest Features.

The construction of the ovens embodies the latest features of oven design, such as self-sealing doors and brick-lined gas off-takes. Chambers and heating flues are built of a high grade 95 p.ct. silica, which ensures a long life of the brickwork, and permits high coking temperatures, and hence high gas yields.

The heating flues are designed as hair-pin flues with waste-gas circulation, by which excessive local temperatures are avoided, so that the coal charge is uniformly heated. The coke quality is consequently improved, and the fuel consumption reduced. Each oven has its own regenerators arranged in pairs on either side of a central division wall.

Coal is charged from the larry carrying a predetermined weight of coal through one of the three charging holes situated in the roof of each oven. During charging, the escape of smoke and dust is avoided by the operation of steam ejectors fitted to gas off-take pipes. The charge is levelled by means of a leveller carried on the discharging machine, which leaves a free space of about 1 ft. over the top of the charge. At the normal carbonizing period of 19 hours three or four ovens are discharged every hour; charging and discharging operations take 2½ and 4 minutes respectively.

The coke is discharged from the ovens by a ram of the portal type, driven by an 80 h.p. electric motor. The ram, in common with all other machinery, is arranged in duplicate. The pushing speed is 60 ft. per minute. The coke passes through a travelling coke guide into a quenching car, holding 12 tons of coke which is propelled by an 80 h.p. electric locomotive. The coke is quenched in this car under a concrete quenching tower adjoining the central coal service bunker, after which it is discharged on to an inclined wharf so as to allow the surplus water to evaporate. By suitable adjustment of the quenching time, which varies usually from ½ to 1½ minutes, the moisture content of the coke can be regulated so that it does not exceed an average of 2 p.ct. with a maximum of 12 p.ct. in the sizes between ¾ in. to 1¼ in. As the wharf holds three coke charges, the time allowed on the bench is about 40 minutes per charge. After this period, the coke is removed through gates to a belt conveyor, leading to the central screening and grading plant.

The gas leaves the ovens through off-takes situated at the end of each oven. These are cast-iron tubes 16 in. in diameter, lined with firebricks, and fitted with liquor sealed cups, which shut off the pipes from the gas collecting main during charging and discharging operations.

Producer Plant.

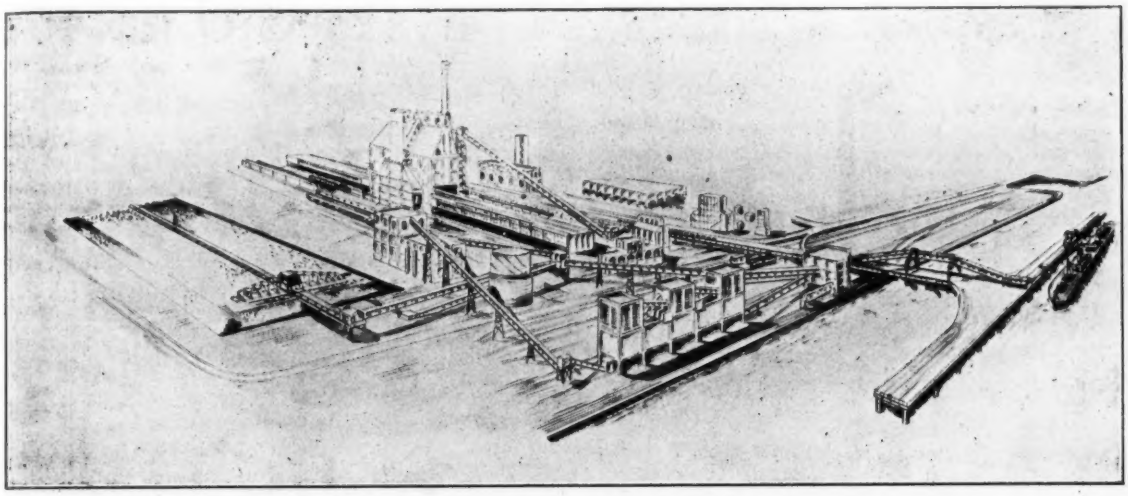
The producer plant supplying the ovens with fuel gas is housed in a separate building and consists of nine mechanical producers of 8 ft. 6 in. internal diameter, eight of which are in operation, while one acts as a standby. The eight producers are capable of gasifying in 24 hours 168 tons of coke breeze (below 1¼ in. mesh), containing up to 30 p.ct. of ash and moisture, and about 30 p.ct. of material below ⅝ in. The fuel is obtained from the coke grading plant and stored in a service bunker of 600 tons capacity, from which it is fed by small skips into the producers at intervals of 20 minutes per producer, or 2½-minute intervals for the whole plant. A mechanical distributing device on the producers prevents segregation of the fuel, and ensures an even fuel bed. As the producers are water-jacketted they generate the steam for saturating the blast. Although the steam produced is in excess of the requirements for this purpose, the surplus cannot be used, except for the heating of bath water and lobbies, since it is of low pressure (7 lbs. per sq. in.). The producers, therefore, depend on extraneous sources for power, which is supplied as high-pressure steam and electric current from the works' power plant for the driving gear of the producers, and the auxiliary plant such as water circulating pumps and the direct coupled exhauster-blower. The latter is arranged in duplicate; one has an electric drive, while the other is driven by a turbine.

The gas leaving the producer is cooled and washed in water scrubbers, and after passing the exhauster is freed from tar and moisture carried in suspension in extractors built on the impact principle. Clean producer gas thus reaches the ovens, which has a dust content of 2 to 3 grns. per 100 c.ft. (4·6-6·8 gm. per 100 cub.m.) and a temperature of about 30° C. (86° Fahr.).

Opening Ceremony.

His Royal Highness flew to Hornchurch, where he was received by Sir David Milne-Watson, the Governor of the Gas Light and Coke Company. He drove from Hornchurch to Beckton and there inspected a Guard of Honour composed entirely of co-partners in the Gas Light and Coke Company and belonging to the 12th London Regiment (The Rangers), three out of four Companies of which are drawn from the Gas Light and Coke Company. The Guard of Honour was under the command of Capt. C. W. M. Rogers.

Cheered by a large gathering of the staff of the works, the Prince then walked to a marquee facing the new coke-oven plant, where Sir David Milne-Watson welcomed him in the name of the Directors and every one of the members of the Company, and said how glad they were to have him to open their new plant. Sir David said that they recollected that last week his Royal Highness went up to the North and visited the rather distressed area around Newcastle. This was interesting to them particularly because they obtained most of their coal there. He went on to refer to the opening of the coal-handling plant at the works by the King and Queen in 1926 and to the Duke of York's



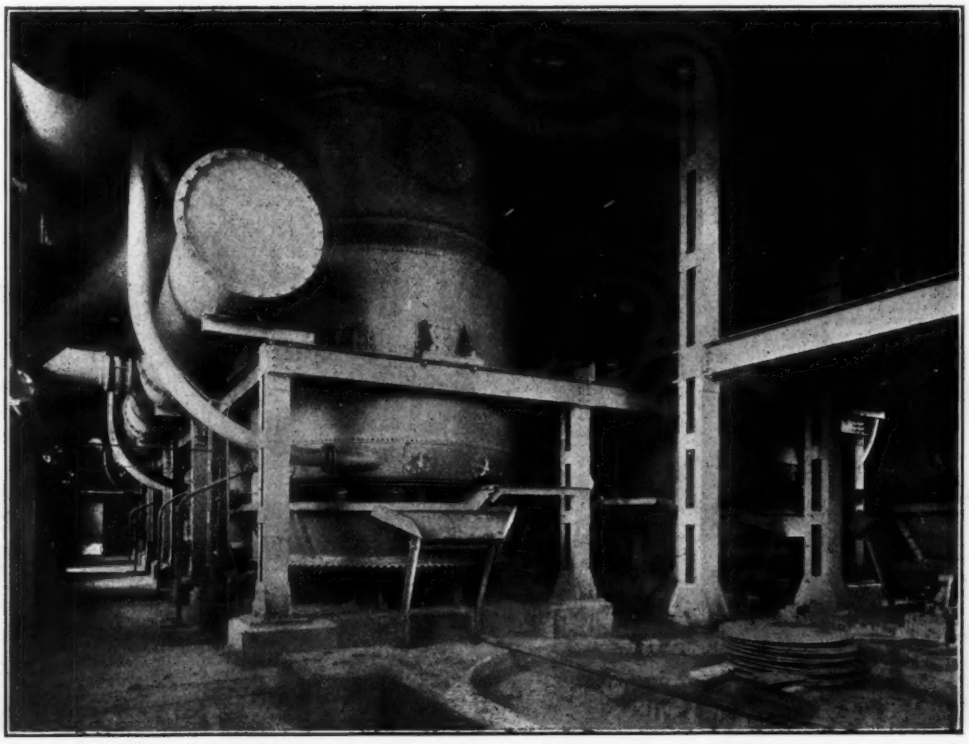
SKETCH OF THE BECKTON COKE OVENS AND COKE HANDLING PLANT.

visit a few years before; the Prince's visit on this occasion was another example of the great interest taken by the Royal Family in the industry of the country—a great encouragement to them in difficult times. His Royal Highness, added Sir David, was now in the largest gas-works in the world, directed by the oldest gas company in the world. The Gas Light and Coke Company was founded in 1812, when they received a Royal Charter from George III.

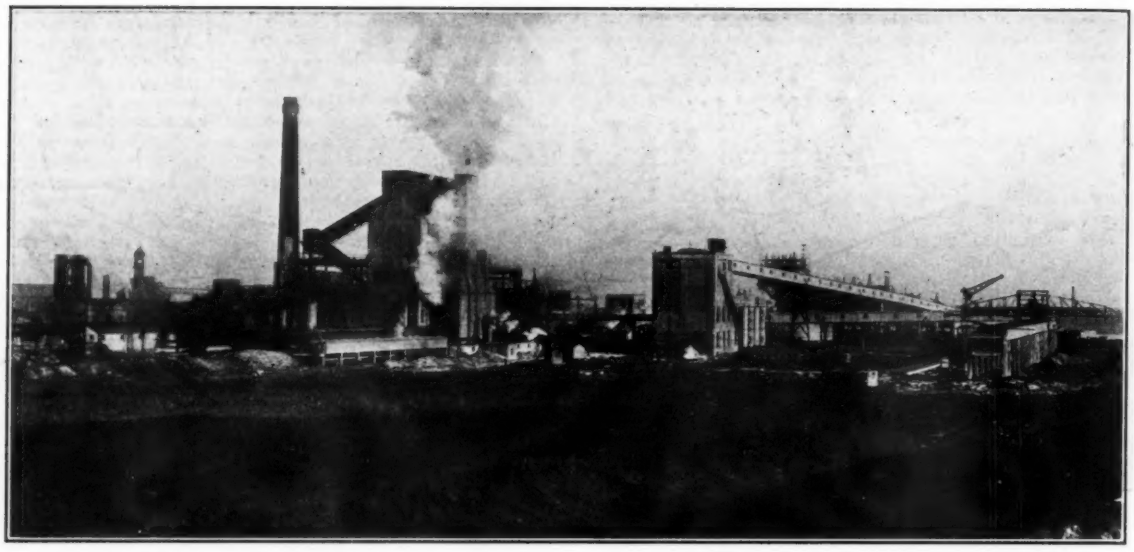
H.R.H. THE PRINCE OF WALES thanked those present for the kind way they had welcomed him, and said that it was a matter of great interest and pleasure to him to come to this great manufacturing plant. He thought they all knew the great interest he took in the manufacturing and business concerns of the country and especially firms like theirs, which were very progressive ones. He was always glad to see anything new, and he had been looking forward to what they were going to show him and to the starting up of these great coke ovens which they had invited him to open. He would like to remind them that he was a great user of gas himself—(cheers)—and he wanted to thank the Company for the kind help they had recently given him in this direction. He appreciated the quick and efficient manner in which the work was carried out. [The Prince was referring to work recently carried out by the Gas Light and Coke Company in connection with the gas installation at his house at Sunningdale.]

At a signal from the Prince one of the coke ovens was discharged, and the party watched 16 tons of red hot coke emerge from the chambers where the temperature is kept at 1400° C. The glowing coke was conveyed into a quenching tower where it was cooled and sent off great clouds of steam.

The Directors and some of the senior officers and men of the Company were presented to the Prince, who received from Sir David Milne-Watson a silver dolphin, designed and executed by Mr. Omar Ramsden and mounted as a paper-weight, as a memento of his visit.



PRODUCERS SERVING THE BECKTON COKE OVEN INSTALLATION.



GENERAL VIEW OF THE COKE OVENS AT BECKTON, TAKEN DURING THE QUENCHING OF HOT COKE. THE COKE STACKING ARRANGEMENTS ARE TO BE SEEN ON THE RIGHT.

A Tour of Inspection.

After a tour of inspection of the producer gas plant, his Royal Highness mounted the coke oven battery and himself pushed a charge. He climbed into the control cabin from which he worked levers operating the ram machine. The Prince, next, walked along the platform above the coke ovens and from there proceeded to make a tour of the plant. Part of the Royal tour was carried out in the inspection coach on the overhead line belonging to the 66 miles of railway track in Beckton—and his Royal Highness showed great interest in the coal unloading and handling plant at Gallions Reach.

He was shown how benzole motor spirit, road tar, fertilizers, and other bye-products, including moth balls, are part of the output of a gas-works.

The new Beckton benzole plant is the largest in the world, and the whole installation inspected by the Prince will produce every day 15 million c.ft. of gas, 5 tons of sulphur, 3000 gallons of benzole, and 12,000 gallons of tar.

The Prince stayed for a considerable time at Beckton asking a number of questions about the work conditions and also showing very keen interest in the research laboratories. He expressed himself extremely pleased with what he had seen and heard and he did not leave until 6.30.

ANOTHER GENERAL VIEW OF THE BECKTON COKE OVENS, WITH THE PURIFIERS IN THE FOREGROUND.

Gas Undertakers' Powers of Investment

Consideration by a Joint Parliamentary Committee

A Joint Committee of both Houses of Parliament sat in Committee Room E of the House of Lords on Thursday and Friday, May 5 and 6, to consider the problem of the powers which gas undertakers should have in regard to the investment of their capital in the securities of other companies.

The Committee consisted of Lord Marks (Chairman), Lord Fairfax of Cameron, Lord Carnock, Lord Russell of Liverpool, Lord Swinfen, Mr. McKeag, Major McLean, Mr. Nunn, Sir Arthur Michael Samuel, and Mr. Thomas Williams.

Three Private Acts—the Newcastle-on-Tyne and Gateshead Gas Act, 1929, the Aldershot and District Gas and Water Act, 1931, and the Gas Light and Coke Company's Act, 1931—contain clauses which enlarge the powers already given to gas companies in this respect, and there are four Bills promoted this session which also seek powers to enlarge the powers of investment of the promoters. These Bills are promoted by the South Metropolitan Gas Company, the Commercial Gas Company, the South Suburban Gas Company, and the Mid-Southern Utility Company, and they contain clauses which ask for powers somewhat beyond those recommended in the interim report of the Gas Legislation Committee, presented in April of this year. It is suggested that these extended powers, which would enable the gas undertakers possessing them to invest a limited amount of capital in other gas undertakings and in companies concerned with processes in connection with residual products or the products arising from their conversion, or coal, or appliances or materials used in connection with the manufacture, distribution or use of gas, should apply only to the large gas undertakers.

Terms of Reference.

The terms of reference of the Committee were to consider the interim recommendations of the Gas Legislation Committee, and generally the extent to which gas undertakers should be authorized to invest funds in other undertakings.

The matter was introduced by Mr. J. H. Thorpe (Counsel for the Board of Trade), and Mr. J. F. Ronca (Director of Gas Administration) was in the room throughout the proceedings.

Sir Lynden Macassey, K.C., Mr. W. E. Tyldesley Jones, K.C., Mr. Craig Henderson, K.C., and Mr. Hope were Counsel for the South Metropolitan, South Suburban, and Commercial Gas Companies; Mr. Tyldesley Jones and Mr. H. F. Bidder represented the National Gas Council; and Mr. Jaques Abady and Mr. Maurice FitzGerald represented the Mid-Southern Utility Company.

At the commencement of the proceedings, Sir A. M. Samuel, Lord Swinfen, and Lord Carnock intimated that they held stocks in the Gas Light and Coke Company, the South Metropolitan Gas Company, and others. Sir Lynden Macassey, K.C., however, congratulated them, and assured them that there would be no objection to their sitting on the Committee on that account.

Proposals of the National Fuel and Power Committee.

Mr. Thorpe (for the Board of Trade), introducing the matter to the Committee, dealt briefly with the activities in this connection of the National Fuel and Power Committee and the Gas Legislation Committee. The former Committee, he pointed out, was a permanent technical Committee which advised the Government on mattters of difficulty as they arose. In July, 1927, there had been referred to the Committtee, for report, memoranda prepared by the National Gas Council and the Board of Trade, relating to amendments of gas legislation. These memoranda were referred to a Sub-Committee, and its report was adopted by the full Committee and submitted to the Board of Trade. (This is the Second Report of the National Fuel and Power Committee, dated January, 1929). The report contained proposals for simplifying procedure, and recommended that, subject to certain reservations, an alternative procedure to that under section 10 of the Gas Regulation Act be provided to enable gas undertakers to obtain from the Board of Trade, by means of a Departmental Order, powers in relation to various matters. These included (1) the authorization of Joint Gas Boards of local authorities owning gas undertakings and/or gas companies and other companies, &c., affording or taking a supply of gas, and so to facilitate the linking up of undertakings; (2) the power to companies to make capital contributions to a separate company, not issuing capital to the public, formed for the express purpose of laying and operating inter-connection mains, and in the case of local authority undertakings to authorize the payment of rents, &c., for the use of the mains; (3) the power to contribute to territorial gas associations formed for the assistance of small undertakings in scattered districts; (4) the power to hold shares in and lend money to other gas undertakings; (5) the authorization of greater facilities for supplies of gas in bulk; (6) the joint use of plant and other facilities; (7) the joint use of purchase, transport, landing, delivery, &c., facilities; (8) the establishment of joint research establishments.

These, said Mr. Thorpe, indicated an expansion of the general principle as regards the operations for gas companies, but the proposed powers as to investment were restricted to powers of investment in companies carrying on operations of such a nature as the companies proposing to invest were themselves carrying on, or with objects closely allied to that matter.

Subsequently the Gas Legislation Committee was appointed, under the Chairmanship of Mr. F. J. Wrottesley, and while they were still deliberating, the Bills of the South Metropolitan, Commercial, and Suburban Gas Companies, and the Mid-Southern Utility Company, were promoted. Fortunately, the Gas Legislation Committee had issued an interim report before those Bills had gone to a Parliamentary Committee. As he undertsood the position, the present Joint Committee, after hearing the evidence, would make recommendations to Parliament as to the principles which should guide those and subsequent Committees in considering what extended powers should be given to gas companies. He asked, therefore, that the Committee would accept the recommendation of the Gas Legislation Committee, as stated in the interim report.

Gas Legislation Committee's Report.

In the report the Gas Legislation Committee had referred to the suggestion of the National Gas Council that certain sections of the Newcastle-on-Tyne and Gateshead Gas Company's Act, adapted where necessary to meet the circumstances of gas undertakings owned by local authorities, contained provisions which it was suitable for all gas undertakings to have. Mr. Thorpe emphasized that this was not the opinion of the Gas Legislation Committee, nor of the Board of Trade. The Sections of the Newcastle Act referred to gave very wide powers in respect of the investment of capital in other concerns. The Gas Legislation Committee had stated that certain of the powers given under these sections appeared to be extremely wide for general application, and that while Parliament had in its wisdom deemed it right to confer such powers on the Newcastle Company, the Committee could not recommend that such wide and indefinite powers be given to gas undertakers in general. It would be very difficult, commented Mr. Thorpe, for a Committee sitting under the authority of Parliament to speak in stronger terms of something which Parliament had already thought fit to do.

The Gas Legislation Committee had seen considerable objection to any proposal to enable statutory gas undertakers in general to acquire financial interests in commercial undertakings which were not calculated to be of direct benefit to the Gas Industry, and which might result in losses which must ultimately become a burden on gas consumers. On the other hand, they had suggested the following clause to embody their recommendations as to the powers which gas companies should have:

"It shall be lawful:

"(*a*) for any undertaker not being a local authority (subject in the case of an undertaking being a company registered under the Companies Act, 1929, to its being so authorized by its Memorandum of Association) to apply money raised by way of share capital or borrowed on mortgage of the undertaking to an extent not exceeding one-twentieth, or, with the approval of the Board of Trade, to an extent not exceeding one-tenth, of the aggregate amount which the undertaking is for the time being authorized to raise as share capital and to borrow on mortgage for purposes of the undertaking; and

"(*b*) for the Minister of Health, with the concurrence of the Board of Trade, to sanction (subject to such terms and conditions as to re-payment or otherwise as he may think fit to impose) the borrowing of

money by an undertaker being a local authority to an extent not exceeding one-tenth of the capital expenditure for the time being on the gas undertaking of the undertaker;

for purposes of purchasing, acquiring or holding any shares, stock, mortgages or debenture stock of any company:

" (i.) carrying on any such operations as they themselves are authorized to carry on; or

" (ii.) engaged solely in developing inventions or processes in relation to and likely to improve the manufacture or supply of gas or the utilization of residual products obtainable in or resulting from such manufacture.

" Provided that the powers to invest money for purposes specified in sub-paragraph (ii.) shall apply only in the case of an undertaker whose sale of gas in the preceding year has exceeded a quantity equivalent to 250 million c.ft."

(The term " company " used in the clause was intended to include both companies registered under the Companies Act, 1929, and companies incorporated by Act of Parliament.)

The Committee had added that they had had under consideration the question of general as distinct from special powers, and hence such restrictions as they recommended should be imposed concerned only powers to be conferred by general legislation; individual undertakers desiring powers beyond those recommended should apply for them by promoting a Bill in Parliament.

Mr. Thorpe emphasized that the proposed clause limited the amount which a local authority undertaking or statutory company could invest, and the companies in which they might invest were confined to those in sub-paragraphs (i.) and (ii.).

The CHAIRMAN, in the course of a discussion as to the Gas Legislation Committee's intentions, said he gathered the Committee were of opinion that if gas undertakers wanted wide powers which would enable them, for instance, to invest in a company manufacturing pipes, or something of that character, which was not actually concerned with the production of gas, but might be used with it—as the Newcastle Company had power to do—they must come to Parliament for such powers; but that general power might be given for investments in companies which were doing similar work to that which the investing companies were entitled to carry on, but not the manufacture of pipes.

Mr. THORPE said that was the way in which he would have sought to put it forward.

Wide Powers of the Four Bills.

The South Metropolitan Gas Bill, now before Parliament, contained a clause which would confer very wide powers upon the Company. It included power to invest in an undertaking " for or in connection with which residual products or other products manufactured or dealt in " by the Company were or could be used; that power would enable the Company to take a share, or perhaps a controlling interest, in a company which was concerned in the use of dyestuffs. Dyestuffs were residual products of coal, and with that power the Company could take a controlling interest in such a Company as the Calico Printers' Association. Counsel gave examples *ad absurdum* to show the lengths to which the Company would be able to go. The Company would, for example, have a completely free hand as to the manufacture of pipes, stoves, and mantles, and there seemed to be no limit to where that might lead. There were limitations as to the proportion of the issued capital of the Company which could be devoted to such purposes.

The Board of Trade had submitted reports to Parliament, in respect of the four Bills containing such clauses this session, and in respect of the previous Acts referred to, drawing attention to the fact that the powers asked for were extremely wide; so that its attitude all through had been consistent. In the report on the four Bills this session it had suggested that it might be desirable for the matter to be considered in its various aspects by a Parliamentary Committee. Since that report was submitted, the Gas Legislation Committee had submitted its interim report, and the Board of Trade had made a supplementary report, drawing attention to that interim report. In this supplementary report the Board had stated that the Bills now in Parliament were promoted by companies to which there could be no objection to giving the widest powers which it was advisable to confer on statutory public utility companies, but had pointed out that the powers asked for by them would enable the companies to invest in, or lend money to, almost any kind of enterprise. The Board also pointed out that it had been the practice of Parliament in the past to prohibit the manufacture of gas apparatus by statutory gas undertakings, and had suggested that any departure from this practice should not be made except after very careful consideration, not only in the interests of consumers of gas, who would bear the greater portion of any loss incurred, but also in the interests of other industries. One of the primary objects of investment powers was to facilitate arrangements for " rationalization " in the gas and closely allied industries. The power of rationalization in, for instance, the pipe-making industry might be seriously prejudiced were the large market which gas undertakers created for pipes to be closed because gas undertakers working under statutory powers invested in or set up a manufacturing business competitive with those now working.

The Point of View of the Private Trader.

Mr. Thorpe urged that it was grossly unfair that practically unlimited powers should be given to gas companies in matters which might quite well be regarded as speculative; it was unfair to the consumers of gas, and unfair to the trader who, as a private individual without statutory powers, was producing commodities which gas companies required. In a reference to the factors which had moved Parliament to take a particular line in this respect he recalled that when the railway companies had sought powers to operate aeroplanes they had also sought power to manufacture them. The Secretary of State for Air, however, had been apprehensive of danger to the survival of existing aircraft manufacturing firms in a state of efficiency if the railway companies were allowed to engage in the manufacture of civil aircraft. When the Railway Companies' Bill was passed it contained a provision prohibiting manufacture.

Mr. TYLDESLEY JONES pointed out that that was inserted by agreement and was not discussed before Parliament.

Mr. THORPE added that the Railways Road Transport Bills did not allow the railway companies to manufacture road vehicles.

Sir LYNDEN MACASSEY said that power was given to the railway companies to take financial interests in road transport concerns—many of which were limited companies who could manufacture, and were manufacturing, their own vehicles.

Mr. THORPE, referring again to the investment powers sought by the gas companies, pointed out that the gas consumer was in a sense a partner with the gas producer, but his interest would be very seriously jeopardized if the producers of gas were given unlimited powers to invest in comparatively speculative concerns outside the concerns which should immediately interest them. Again, it would be most unfair to traders who had built up their businesses in anticipation of gas companies being their customers, for they could quite well be driven out of business thereby.

Lord RUSSELL OF LIVERPOOL asked if there had been opposition to the investment clauses in the various Bills by parties interested.

Mr. THORPE said he was told not; but it was a little difficult to anticipate where opposition would come from.

Sir LYNDEN MACASSEY pointed out that there was no opposition to the clauses at this inquiry, except by the Board of Trade.

Addressing the Committee on behalf of the South Metropolitan, Commercial, and South Suburban Gas Companies, Sir Lynden emphasized that the object of the Companies in asking for these powers was not to embark upon a business which was distinct from and alien to the business of gas manufacturers, but was for the purpose of, as far as possible, cheapening and reducing the cost of production of the gas they manufactured, and reducing the selling price. It was absolutely foreign to their intentions to exercise those powers for any other purpose. The powers sought followed reasonably on what had been in the past the policy and practice of Parliament in regard to gas companies; secondly, the powers were required by large gas undertakers if, under present conditions, they were to be enabled still further to reduce the cost of production of gas; thirdly, the record of the three companies in meeting the needs of consumers for cheap gas was such that the exercise of these particular powers could be confided to them with confidence.

Sir Lynden, having discussed the history of gas undertakings, asked the Committee first to accept the recommendation of the Gas Legislation Committee that individual undertakers, desiring powers beyond those recommended in the interim report, should apply for them by promoting a Bill in Parliament; and, acting in pursuance of that recommendation, he submitted a clause to confer powers which could reasonably be conferred upon the three gas companies which he represented.

The CHAIRMAN asked if it were proposed that the powers contained in the clause should be regarded as model powers for other large undertakings who asked for them, or only for the three gas companies.

Sir LYNDEN MACASSEY said he was concerned chiefly at the moment with the three companies, but as he understood that the Committee was concerned with the wider question, the Committee would want to consider whether the powers which it was expedient to confer upon these

three companies it was also expedient to confer on other companies in similar circumstances. He suggested that the powers asked for by the three Metropolitan Companies could fittingly, if the Committee approved, be applied to other large undertakings having authorized capital and borrowing powers exceeding one million sterling, if those undertakings applied for them. There were 22 companies and 15 local authorities in the country having gas undertakings with authorized capital and borrowing powers in excess of that amount, as shown by the Board of Trade Returns for 1930.

The clause proposed was based on the clause inserted in the South Metropolitan Gas Bill, but had been amended in order to meet some of the criticisms of the Board of Trade. It was as follows:

" (1) The Company may purchase or acquire and hold or dispose of any share, stock, mortgages, debentures, or debenture stock of or lend money to any company or body where such company or body—

(i.) are themselves engaged in the manufacture, distribution, or sale of gas or residual products; or

(ii.) carry on or are about to carry on any undertaking business or process for or in connection with the manufacture of residual products or the products arising from the working up or conversion of residual products; or

(iii.) carry on or are about to carry on any undertaking or business for or in connection with the production, carbonization, gasification, sale, or distribution of coal or coke or of products arising therefrom; or

(iv.) carry on or are about to carry on any undertaking or business for or in connection with the making, producing, or dealing in appliances or materials used in connection with the manufacture, distribution, or use of gas:

Provided that—

(*a*) the powers of this section shall only be exercisable by the Company so far as they are conducive to the more economical or efficient manufacture, distribution, sale, or use of gas;

(*b*) the aggregate amount applied by the Company for the purposes of this section and remaining so applied at any time shall not exceed one-tenth part of the nominal amount of the issued capital of the Company for the time being;

(*c*) the amount applied by the Company for the purposes of this section in the case of any one company or body and remaining so applied at any time shall not exceed one-twentieth part of such nominal amount as aforesaid except with the approval of the Board of Trade; and

(*d*) the Company shall give notice of any application for the approval of the Board of Trade under the foregoing proviso (*c*) to the council of every county wholly or partly within the limits of supply, and the said Board shall, before giving such approval, consider any representations which may be made to them by any such council.

(2) For the purposes of this section, the expression 'residual products' means products arising directly or indirectly from the manufacture of gas."

Sir LYNDEN MACASSEY pointed out that the offending word " oil " had been deleted from sub-section 1 (iii.), oil products.

Sir A. M. SAMUEL asked if the Company would not deal with trinitrophenol or toluole which came from coal as residuals.

Sir LYNDEN MACASSEY pointed out that they could be dealt with under the powers of sub-section (ii.). The effect of the amendment of the clause was to restrict the Company's activities, in respect of oil, to oils which were residuals. Dealing with a question as to whether under (iii.) the Company would be in a position to sell coal, he said that under the ordinary inherent powers of a gas company it could acquire a coal mine to-day, but could not sell the coal from that mine to anyone else. The power in the clause was asked for because it might be found advisable for a large Company such as the South Metropolitan Company to acquire an interest in a mine producing a particular class of gas coal. Such a mine would also produce other coal which was not so suitable for gas manufacture, and which would have to be disposed of, and powers such as were sought in the clause would be necessary to enable them to dispose of the latter.

Mr. WILLIAMS (a member of the Committee) pointed out that the production of coal was a highly speculative business, and suggested that the gas consumers might suffer if a gas company intervened in the production of coal.

Sir LYNDEN MACASSEY replied that to assume that the Company, if it obtained these powers, would go in for a speculative business in any circumstances was to impute to it an entirely different motive from that which had guided its policy and controlled its actions for the last 75 years. The whole object of a gas company in converting its residuals into commercial products had been to reduce the cost of gas production.

Mr. WILLIAMS said he had no doubt about the intention; it was the possibility that he feared.

ALWAYS AN OPPORTUNITY FOR REVIEW.

Sir LYNDEN MACASSEY pointed out that in regard to all the multifarious operations which were carried out by a gas company one could not possibly draw a line on any particular technical basis and say " you can do this, but you shall not do that." It must be left to the responsible Boards of great concerns of this kind. He also pointed out that gas companies had to go to Parliament frequently for further capital powers, and that that provided an opportunity for the review of what had been done in the past.

Mr. THORPE said there would be another opportunity when a company had lost all its money down a coal mine; it would have to come to Parliament for leave to abandon.

Sir LYNDEN MACASSEY said he did not know if he were to take that as a serious objection of the Board of Trade.

The CHAIRMAN added that it was a question for the shareholders.

Dr. *C. Carpenter* (President of the South Metropolitan Gas Company and Chairman of its Board of Directors, and Chairman of the Commercial Gas Company and the South Suburban Gas Company) gave evidence, and said that a low selling price for gas was more and more important, in view of the keen competition of electricity and oil. He had been surprised to hear the suggestions that possibly the possession of the powers sought would enable the Companies to go in for speculative business; he could not conceive of any Board of Directors associated with the management of a gas company flying off at such tangents as were suggested. They wanted powers to improve the efficiency of the business and to extend it, and only in that direction would they be likely to do anything; but supposing they did carry out proposals of the kind indicated by Counsel for the Board of Trade, the shareholders would be asking questions. Further, when they went to Parliament from time to time, all that they had done during the preceding decade, or shorter period of time, could be brought up against them. They ought to have the credit for managing their business as a commercial undertaking and in a commercial manner. Again, the London County Council was very vigilant, although very fair, in watching the proceedings of the gas companies in its area. He did not know any of the larger undertakings in the country that would be likely to abuse powers of the kind which the three Metropolitan Companies were asking for.

MANUFACTURE OF METERS.

Asked if there might be circumstances in which it would be of advantage for the gas companies to take a financial interest in a company or body engaged in the manufacture of gas or residual products, rather than to resort to amalgamation, he agreed, and suggested that the amalgamation principle might be carried too far. With all the qualities of the gas undertakings, there were respects in which they were not so qualified to carry on businesses outside their own particular one as those engaged in that particular business. It was in a sense unfortunate that the gas companies had had to do many things which were outside their business. It ought not to have been necessary for them to have set up as manufacturers of meters on the large scale on which they are working to-day. They had had to do it, but it would have been very much better if they had been able to associate themselves with some other undertaking whose primary business was the manufacture of meters. If his Companies were not getting meters of the quality and kind they wanted, they could begin to make their own. All companies were not large enough to enable that to be done economically; but if they were in a position to support an undertaking and get them to carry on as large manufacturers of meters of the kind they (the gas companies) wanted, it would be to the advantage of the smaller gas companies, and indirectly, to the larger ones as well. Discussing the difficulties of his own Companies in this connection, he said they had had a great deal of difficulty with dry meters in the part where the leather was fastened to the metal mechanism; the leather had become rotten and had broken, with the result that the meters had passed a certain proportion of unregistered gas. It was not a popular thing with a consumer to tell him that a meter was not registering sufficiently and must be replaced. It was important that such an instrument should be reliable, and that the leathers used should be of the right quality. The Companies had been unable to obtain from any of the meter makers with whom they were in touch, leathers of the required durability, and as a last resort they had got into touch with Prof. Lamb, an expert, who had conducted an investigation, extending over some years, to provide a

specification for producing leathers of the quality desired. The result was that for many years since, the Gas Companies had been able to manufacture meters under that specification which had given great satisfaction from the point of view of continued accuracy. They had had powers to manufacture since 1902. Whatever might have been the position when the Companies had embarked upon that procedure, to-day they had quite enough to do without the responsibility of manufacture of that kind. If they had powers of the kind for which they were asking, and if similar conditions were facing them to-day, it would be much more satisfactory to attach themselves to an organization whose business was to manufacture meters, rather than that they should have on their own shoulders the additional responsibility, not only of making accurate meters, but of making them in an economic and commercial way. He could make meters and sell them, under the present powers, but could not invest £50 in a company making meters. There were matters of technique which inevitably followed if one were associated for a long time with the manufacture of a commodity. That was one of the reasons why manufacturers could attain a perfection which was not, generally speaking, possible in the case of an organization which did not exist for the specific purpose.

As an example of the value of the powers concerning residuals, he said that one of the Metropolitan Companies was asking Parliament to confirm arrangements entered into with regard to the absorption of Companies at Sevenoaks and Tonbridge. Both these undertakings would be producing tar. There was already a tar works in the middle of Kent, and it might be more advantageous to all parties if, instead of having to bring to London the tar produced in those two gas-works, they had power to enter into an arrangement with the Company owning the tar works by which that Company would take the tar from the Sevenoaks and Tonbridge works and worked it up to a specification.

Again, the Gas Companies would like to be able to associate themselves with an undertaking for producing, from oil made in the process of distillation, a material to be used for eliminating blight or fungus from fruit trees. The Gas Companies had not machinery for that purpose. They had experimented with "Winter Wash," a highly valuable and very useful disinfectant—a particular fraction of the phenols which was very efficacious—but they had no organization for marketing such an article, and it would be wasteful and uneconomical if they started one. It would be better to go to a firm producing these agricultural articles, which firm could take their product, market it, and give them (the Gas Companies) a proportion of the profits.

He had been very anxious for the managers of the Gas Companies to get into close association with a very capable and progressive firm of tar distillers, but it had turned out that the only way of doing that was the entire purchase of the undertaking. He could not face that responsibility; but if the Gas Companies could have taken an interest in that undertaking they could have worked together to their mutual advantage.

Low-Temperature Carbonization.

Low-temperature carbonization was a very important factor and would be still more important in the future in dealing with the coal question. The obvious way to proceed would be for the Gas Companies to associate themselves with one or more undertakings in order that they might obtain definite knowledge with regard to it, and that they might work together in regard to the preliminary stages preceding the erection of large-scale plant. The alternative was—the Gas Companies having come to the conclusion that it was time they took an important interest in it—that they should get one of these undertakings to put up plant for the purpose of manufacturing low-temperature fuel. The Gas Companies had, at a cost approaching £200,000, put up a plant for this purpose. He would have preferred that they should have associated themselves with an undertaking experienced in that work. Fortunately, there was every prospect of its turning out all right, but it was a responsibility which the Board had taken. It might be asked why the Board of Directors had engaged in a speculation in putting up low-temperature plant, which had not had altogether the best of reputations for the last 25 or 30 years. He considered that it was justified, even if it had turned out a failure; if the Board did not take such responsibilities, no progress would be made. It was bound to do it, taking, of course, the necessary precautions to assure itself that the prospect of success was reasonable.

The Chairman said that perhaps some of the members of the Committee would like to know the difference between that which would be justified as experiment associated with gas and that which they might think rash investment in outside undertakings.

Dr. *Carpenter* replied that that responsibility must fall on the shoulders of the Board of Directors, who were answerable to the shareholders, answerable, through the public authorities, to the gas consumer, and answerable to Parliament. The fact that complaints with regard to gas undertakings and their prices had been non-existent for a very long time was another indication that the public were satisfied with the service given by the gas undertakings.

With regard to coke, under the powers sought they could take an interest in a firm which could market and distribute their coke. Many tenders from public authorities, such as the War Office, the London County Council, asylums, and so on, were joint tenders, for supplies of coal and coke, and it would be helpful if the coal suppliers could also market the coke.

Mantle Making.

As to gas mantles, Dr. Carpenter said there was still a large gas lighting load in London. Realizing the importance of efficiency and durability of the mantle, he had tried to enter into an arrangement with a progressive manufacturer. It was not a question of price of the mantles, but quality and durability. He had had various conversations with the manufacturer, but they had come to nothing, because the manufacturer had said quite frankly that he was not interested in mantles which had an unlimited life. If they lasted for ever, a large proportion of his business would be gone, and he had preferred to continue making mantles of the ordinary kind, which the public were ordinarily satisfied with, because they could get no better. The other important point in regard to the mantle was that its contour should fit the contour of the flame. There had been great difficulty in getting that specification carried out. With regard to many of the kinds of mantles which his Companies purchased, he had a strong suspicion that their rejects were sold to the ordinary public. At any rate, he had to give up any hope of association with the mantle manufacturer on the lines suggested, and his Companies had had to start investigating and learning the whole subject for themselves. It had cost them a great deal of money, and they were at it, perhaps by reason of their particular ignorance of the matter (the text-books were not very helpful) six or seven years, learning how to make a mantle more durable and more efficient than that ordinarily supplied. That was a waste of time and money. It would have been much better if he could have been in a position to take a financial interest in the mantle-maker's business, so that they could have worked together; it would have been more economical.

One of the Gas Companies had, in a roundabout way, supported a firm manufacturing appliances, so that it could supply what the gas consumers wanted. It was done under certain powers by taking money out of the Reserve Fund for the purpose, and the firm was a very important factor in the machinery needed to supply the requirements of the gas consumers. It was done solely in the consumers' interests.

The question of tubing was most important. The gas companies from the very beginning had used butt-welded wrought-iron tubing, made of puddled strip. As the result of what was sometimes called "rationalization" his Companies had suddenly been told by the persons who had been supplying this tubing that they had associated themselves with an undertaking whose products were wholly steel-produced, and that in future the gas companies would have to be content with steel tubing. This was not nearly so good as puddled iron tubing for distributing gas. Having regard to the extreme character of the responsibilities of gas companies with regard to the safety of the public, his Companies did not feel justified in departing from the practice they had followed for many years. Intermediately a Committee of the Institution of Gas Engineers had reported that the use of puddled iron tubing by gas undertakers should be continued. However, only after his Companies had threatened to use some of their money to interest someone in providing a mill for the manufacture of strip, and of getting someone to produce tubing from it, had the steel tube producers given way and had agreed to supply what was wanted.

As to the suggestion that, if the powers asked for were granted, the pipe-making industry might be prejudiced, he said his Companies had no desire to set up as pipe makers.

Mr. Thorpe, cross-examining, said that if all the gas companies in the country with a capital of a million pounds or over were given the powers sought by the Metropolitan Companies, they would probably represent the largest body of undertakers in the country who could really harm the manufacturer.

Dr. *Carpenter* said he did not know to what extent they could, but he certainly did not think they would.

Counsel pointed out that the Committee was considering powers, not intentions. He asked if it followed necessarily that a company would produce a better article because the gas company had invested money in it.

Witness said that most likely they would. The gas com-

pany were the users of these things and knew more about their points of weakness; they knew the points that required strengthening much better than did the manufacturers.

COUNSEL said the gas company was in a position to tell the manufacturer what was wanted, and the position would not be any different unless the gas company had the control of the business.

Witness replied that whatever proportion of the capital the gas company held, they would be considered to be exercising something like a proportionate control.

COUNSEL asked if it were suggested that there would be no private company in the country willing to make the perfect article.

Witness said his experience had shown that it was not easy.

COUNSEL asked if it were suggested that gas companies in the country were accepting inferior goods because a manufacturer would not give them anything better.

Witness replied that they were accepting, he believed universally, dry meters which were not made with leather of the kind most suited for the purpose, and, therefore, were buying meters of a lower standard than was in his opinion desirable. They could not get anything else.

COUNSEL said he supposed that if the Gas Company invested in a Company owning a coal mine, it would be subject to the general law of the country, and would be subject to the quota and a fixed price for coal.

Sir LYNDEN MACASSEY said that it would.

Witness said that if there were a serious legal disability he still had faith in the power of Parliament to remedy it.

In reply to further questions with regard to coal, he said that the coal producers had become more interested than formerly in the importance of clean coal, and the position to-day was more satisfactory than it had been at any time within his knowledge.

Mr. THORPE pointed out that if the Gas Company took an interest in a coal producing company and the seam operated by the coal producing company ran out, there would be a dead loss, whereas under present conditions, if one coal company in the Durham coalfield struck a bad area, the gas company could obtain its coal from another.

Witness replied that no-one would take an interest in such an undertaking without expert evidence that there was reasonable possibility of success. He could imagine no geological product in the country which had been so carefully measured and estimated as the coal resources.

Replying to the Chairman, Dr. Carpenter said the capital of the South Metropolitan Company on Dec. 31, 1931, was £10,721,152 and the balance unissued was £342,000, and he agreed that according to the recommendations of the proposed clause it would be able to invest over £1,000,000 in outside concerns. Asked if it would be possible, under the terms of the clause, to invest in a Belgian coal mine, he said he had not contemplated that, but there was no geographical limitation in the clause.

Mr. WILLIAMS (a member of the Committee) asked whether, in view of the fact that the number of collieries producing gas coal and making a profit was small, the Gas Company still persisted in the desire to obtain power to invest in that direction.

Witness said it was that knowledge which had whetted his desire for a closer association of that kind, because of the possibility of working a mine under what he conceived to be ideal conditions.

Mr. WILLIAMS asked whether, in existing circumstances, the Company was not in a more favourable position to purchase its requirements, with all the competition which existed, than if it had a mine of its own.

Witness replied that there was no competition to-day, and that the Company had to pay the fixed price. It did not buy coal so advantageously as it did formerly.

In re-examination, Sir Lynden Macassey pointed out that if the Company had powers of investment, it could transfer the manufacture of the efficient mantles it was making to some private concern. Dr. Carpenter said that that was to a large extent what he was aiming at. It was not desirable that he and his colleagues should have the responsibility of making meters, mantles, gas fittings, cooking stoves, &c., which he considered could be better made by outside manufacturers, leaving to the gas undertakings their responsibility directly pertaining to their business. In the 50 square miles area of supply of the South Metropolitan Company it was possible, by the various agencies the Company had, for everybody to get an efficient mantle, and therefore, there was no reason why everybody should not get an efficient and economical light with gas. There were various large areas in the country where inferior mantles were used, and where gas, therefore, got a bad name from the point of view of its use as a lighting agent. In a great many cases the amount of gas lighting by means of the mantle was comparatively small, but in the area of the South Metropolitan Company it was considerable; he believed it would have been greater still had the other undertakings been working under similar advantageous circumstances to those of the South Metropolitan Company.

INVESTING IN COAL MINES.

With regard to power to invest in coal producing companies, he said that if a company had a coal mine producing a particularly good gas coal but was unable itself to provide the necessary capital for the re-organization of its mine, the gas company could provide that money and thereby obtain the good gas coal available. Again, there was the importance of coal cleaning. The amount of stone and shale in the coal was such that it was equivalent to the carrying capacity of one steamer, so that in effect one of the Company's steamers was running backwards and forwards between Newcastle and London carrying stone and shale. The obvious thing to do, if possible, would be to have the coal cleaned at the mine. They would then have the advantage of reduction in freight charges, and could produce a good coke more economically than to-day. The Gas Company had been told on more than one occasion that the collieries could not afford to put in coal cleaning machinery. The Company was putting up plant at its works in London to clean something like 200,000 tons of coal a year. It was quite wrong that it should have to do that in London, in order to produce a coal which in turn would produce the quality of coke required; but it was the only course open to it. If the Company had powers to invest, they could provide the capital for providing the plant at the coal mines.

Sir LYNDEN MACASSEY, referring to the suggestion that the clause proposed would enable the gas companies to invest money abroad, said the intention was to invest only in the United Kingdom, and Dr. Carpenter was prepared to accept any limitation in that respect.

The CHAIRMAN asked whether it was desired to provide that investments should be made only within the British Empire or the United Kingdom.

Sir LYNDEN MACASSEY said it would be gracious to extend the power to the Empire, but Dr. Carpenter had had in mind only the United Kingdom.

EVIDENCE ON BEHALF OF THE N.G.C.

Lieut.-Col. *S. S. Ogilvie* (Joint Manager of the National Gas Council) gave evidence on behalf of the Council, which, he said, represented 90 p.ct. of the total make of gas in the United Kingdom. There were, he said, 1303 gas undertakings in England and Wales, of which 770 were statutory, the remainder being non-statutory, and therefore, unhampered by legislative provisions. The view of the Council was that the restrictions on the statutory undertakings were harming the Industry. It was estimated that the number of persons using gas in the United Kingdom was in the neighbourhood of 40 millions. The make of gas in 1931 was 332,600 million c.ft., which compared with 204,000 millions in 1912—an increase of 58 p.ct. in that period. The quantity of coal carbonized in 1930 was approximately 18 million tons, so that the continuance of the Gas Industry was a vital factor to the coal industry. The National Gas Council was very much concerned with the competition of oil in recent years. The oil companies had brought oil-burning appliances to a high state of perfection; there was automatic heat regulation, and competition with gas and coke in some fields was very intense—as, for instance, in central heating and water heating installations. The oil companies were entirely unfettered; there was no obligation upon them to supply anyone with oil, and they could pick and choose their customers. They had rationalized to the extent that they had formed three very large companies, but, finding that that was not sufficient, they had recently combined their selling organizations; they had extremely able and efficient salesmen, and were spending very large sums of money up and down the country.

Raw coal could never compete with oil; its heat could not be controlled automatically, it had many other disadvantages, and for certain operations it was quite unsuitable. Was this country to be a coal country, as it always had been, or an oil country? Coal had lost much of its business for bunkers, the so-called battle between road and rail transport was another form of the competition of oil and coal, and his submission was that the last trench that coal had got in meeting the competition of oil was the Gas Industry. The carbonizing industries treated coal scientifically, and it was only by the scientific treatment of coal that they could meet the attacks of foreign oil. The Gas Industry had excellent gas burners, with thermostatic devices, and if and when it obtained freedom from the statutes of 1847 and 1871 and the Private Acts built up upon them, the Industry felt sure it could do a lot to meet the competition of oil, as the Gas Industry in America had done.

The CHAIRMAN asked what it was that could be done in America but could not be done here.

Witness referred, as an example, to the methods of charging. He pointed out that price was governed largely

by load factor, and that the consumer should pay according to his demands. The American Gas Industry had built up a scientific rate structure, and could offer, in respect of large-scale use, terms such as the Gas Industry in this country could not offer. This matter had been discussed by the Gas Legislation Committee, and he hoped and believed there would be a favourable report on it before long.

Witness agreed that if gas companies were to be given freedom to invest in other companies which would assist in the development of means for the use of gas, there should be a standard or minimum form of legislation applicable to gas undertakers. As to the suggestion that wider powers should be given to undertakers having a capital of £1,000,000 or more than to smaller undertakers, he said the National Gas Council would prefer that the distinction should be made on the basis of the size of the undertaking, because capital expenditure was not necessarily a criterion. For example, if an undertaking had had to reconstruct its works immediately after the war, when prices were high—as many had had to do—it might have a large capital expenditure, but the undertaking might not be as large as another having a smaller capital expenditure. He suggested that the clause put forward by the South Metropolitan Company, and which he supported on behalf of the National Gas Council, was suitable for application to undertakers which made and sold, say, 1000 million c.ft. of gas per annum. For undertakers whose sale was less than that, he supported the clause proposed by the Gas Legislation Committee, subject to certain reservations. That clause itself proposed to limit its application to undertakers supplying 250 million c.ft. per annum or more, in so far as investment in experimental companies was concerned.

The application of the South Metropolitan clause to undertakers having a sale of 1000 million c.ft. per annum (instead of limiting it to those having £1,000,000 capital) would extend the number of undertakers to whom it could be applied beyond the 22 companies and 15 local authorities mentioned by Dr. Carpenter, and would add to that list certain large undertakings which had been economically capitalized. For example, the Bath Undertaking had a capital of less than £1,000,000; it was very economically capitalized, its make of gas was more than 1000 million c.ft. per annum, and it sold gas very cheaply.

Indicating certain suggested amendments to the clause recommended by the Gas Legislation Committee, he suggested that the undertakings to whom it applied should be enabled to apply money not only to purchasing, acquiring, or holding stocks in the companies indicated, but also "subscribing to" those stocks. The point was that probably the usual method would be to start new companies in which different gas undertakers would invest, and, therefore, they would require power to subscribe to a company which was about to be formed. Again, it would be necessary to give these powers to invest not only in companies "carrying on" such operations as the investing companies were authorized to carry on, but in companies "carrying on *or about to carry on*" such operations. Under the clause as drafted in the Gas Legislation Committee's report the gas undertakers could not subscribe to an issue when a company was formed, but would have to wait until it was formed and then probably buy the shares at a premium. Again, he was not sure whether, under the clause as worded, a statutory undertaker, having acquired shares, would have the right to dispose of them. Therefore, he suggested that the right to dispose of them should be stated specifically.

There was a legal issue arising in regard to the power proposed to be given to undertakers to invest in businesses carrying on "such operations as they themselves are authorized to carry on." He understood the view of the Board of Trade was that that was intended to authorize one gas company to invest in the shares of another, which was most desirable. Each gas company, however, was authorized to supply in a specified area, and the question was whether, in law, two companies would be regarded as carrying on the same operations, inasmuch as each was supplying in a separate area. There was danger that a Court might say that one company could not invest in another because it was not authorized to supply in the same area. He believed the Board of Trade, however, was prepared to make the position clear.

As to the power to invest in companies "engaged *solely* in developing inventions . . .," &c., he said one would never find a company whose *sole* object, as stated in its Memorandum, was to develop this or that invention. Therefore, it was suggested that the word "solely" be deleted.

It was suggested by Sir A. M. Samuel that the word "mainly" should be substituted, but witness pointed out that there was always difficulty in defining words such as "mainly" or "substantially," and it was better that the word "solely" should be deleted altogether.

Mr. TYLDESLEY JONES said that if a company were developing gas mantles and electric light fittings, for instance, a gas company to whom the clause applied could not take an interest in it if the words "mainly" or "substantially" were inserted in the clause.

Mr. THORPE, questioning the witness on behalf of the Board of Trade, asked if there had been difficulties in getting manufacturers to move with the times.

Witness said there were such things as rings and cartels, and standardized articles which might suit some undertakings.

Sir A. M. SAMUEL pointed out that if gas companies worked together to develop certain things, the private manufacturers might make the same point against the gas companies—that the latter might develop into a trust.

Witness said that if an unsuitable article were standardized by manufacturers, surely it was the duty and responsibility of the gas companies to induce someone outside the ring to give them what was wanted. They were merely trying to provide something for their own use or the use of their consumers. He did not use the word "ring" offensively.

The CHAIRMAN: You do not want the gas undertakings to develop into one great concern in connection with all the products they use, and that all appliances connected with the Industry shall be under their control.

Witness: No.

Mr. WILLIAMS asked if there were anything in the clauses suggested which would prevent that.

Witness said he thought the limitation of the amount of capital that could be so invested would prevent it. There was no intention on the part of the Gas Industry to try to oust the manufacturers.

Lord CARNOCK asked if the Industry were afraid that in the future the various manufacturers might combine to increase prices against the gas companies.

Witness replied that that was possible, but he did not fear that they would.

Mr. THORPE asked if the giving of power to "subscribe to" the shares of outside companies would introduce a large degree of speculation in the Gas Industry.

Witness said it would not. He agreed with Mr. Thorpe that if the word "solely" were taken out of the clause giving power to invest in companies engaged in developing inventions, it would enable a gas company to invest in Imperial Chemical Industries, Ltd., or any other company having a laboratory or experimental plant connected with gas matters.

Sir A. M. SAMUEL asked if electrical companies had power to make appliances, such as cables, meters, &c.

Mr. TYLDESLEY JONES, K.C., said they were not given express powers to do so, but he saw nothing in law which would prevent either a gas or an electricity company from making things used in their own business, unless it was expressly prohibited; but it could not sell those things. He was asking for powers whereby gas companies could assist manufacturers to make these things. There was nothing in law to prevent a gas company owning a coal mine and working it, but the company could not sell the coal. If a colliery from which it had obtained its coal had to close down, the gas company would have to work it; surely it was better that the gas company should be able to help the colliery company to carry on, rather than try to work the colliery itself, and rather than that the colliery company should go into liquidation.

Mr. WILLIAMS suggested there was no fear of gas companies being deprived of their fuel.

Witness said he did not wish to open up the thorny question of the quota, but it was a very serious factor. It had been stated that public utilities would have to pay more because they could pass it on to the consumers. But that would kill them in their competition with oil. He did visualize that if coal prices increased 1s. 6d. one year and 1s. 6d. another, the gas companies would have to take steps somehow or other to get their coal at a reasonable price.

Mr. WILLIAMS asked if it were suggested that gas companies were paying an excessive price for coal at the moment.

Witness said the price was increasing. There was only one price for anything in the world, and that was the market price.

The CHAIRMAN, at the conclusion of Col. Ogilvie's evidence, said that the subject was very complicated, but the Committee had been very much helped by the evidence.

Mr. THORPE, in a final address to the Committee on behalf of the Board of Trade, said the Board's view was that if the larger gas undertakers wanted powers of investment beyond those recommended by the Gas Legislation Committee, they should individually ask Parliament for those powers. Was not that the only safe way? The Board could not even now visualize a case where a company could justify asking for those wider powers before Parliament, and he asked that the Committee should not open the door and make it easier than it was at present to obtain those powers. His view was that the Gas Legislation Committee

had visualized this, for they had stated that in putting forward their recommendations in their interim report they had had in consideration the question of general as distinct from special powers.

The CHAIRMAN asked if it were not also the desire to avoid an inquiry into every application by obtaining suggestions by this Committee by way of general legislation.

Sir LYNDEN MACASSEY said it would be very unfortunate if, after the promoters of the Bills now before Parliament had put their case in support of wider powers, other Committees of Parliament were not to have the advantage of this Committee's deliberations.

The inquiry then concluded, and the Committee will consider its decision.

Institution of Gas Engineers' Examinations

The following questions were set in the Examinations in Gas Engineering and Gas Supply, which were held on April 30 and May 7 respectively, under the Education Scheme of the Institution of Gas Engineers

GAS ENGINEERING.

ORDINARY GRADE.

From 2 p.m. to 5 p.m.

(Candidates should attempt not more than six questions.)

1. (*a*) Sketch cross section through a horizontal or a vertical retort giving principal dimensions.
   (*b*) Describe the materials used and give reasons for the shape and construction of the type selected.
2. (*a*) Sketch the top and bottom mouthpieces of a vertical retort, continuous or intermittent type.
   (*b*) Explain how coal is fed into the retort, coke discharged, and gas taken off.
3. (*a*) Give the approximate composition, specific gravity, and calorific value of carburetted water gas from a plant using 1 gallon of oil per 1000 c.ft. gas made.
   (*b*) To what cause would you attribute an excess in CO_2?
4. Describe one type of exhauster with which you are familiar and show by sketches how slip of gas is prevented.
5. (*a*) Give working temperature for the producer, the combustion chamber, and the waste-gas flue, respectively, in a horizontal retort setting.
   (*b*) Describe one type of pyrometer suitable for indicating such temperatures.
6. Describe procedure you would adopt for taking representative sample of the contents of an oxide purifier being emptied, the method of preparing sample for analysis, and the method of determining the percentage of moisture, sulphur, and tarry matter respectively.
7. Describe and illustrate by sketches how the moving parts of a telescopic gasholder are sealed and guided.
8. (*a*) What are the chief characteristics of a good coke for domestic purposes?
   (*b*) Describe one type of screen suitable for grading coke.

HIGHER GRADE.

PART I., from 2 p.m. to 5 p.m.

(Candidates should attempt not more than four questions.)

1. Describe, with the aid of sketches, the construction of and method of heating:
   (*a*) A setting of horizontal retorts; *or*
   (*b*) A setting of continuous vertical retorts; *or*
   (*c*) A setting of intermittent vertical chamber ovens.
2. (*a*) Explain the characteristics of the coal you would carbonize in the type of plant you select in Question 1, stating the district in which the coal is mined and the ash, volatile, and moisture content you would expect to find on testing a sample.
   (*b*) Describe the coke produced from this coal.
3. Sketch a non-recording calorimeter and describe in detail the method of making a test for calorific value.
4. (*a*) Sketch a station meter and describe its method of working.
   (*b*) How would you correct the volume of gas recorded for temperature and pressure?
5. Give the complete analysis of a typical coal gas, stating the percentage of the constituent gases, the volume of each constituent per ton of coal carbonized, and the type of plant in which the coal was carbonized.

Give the calorific value of each of the constituents and the calculated calorific value of the resultant coal gas.

HIGHER GRADE.

PART II., from 6 p.m. to 9 p.m.

(Candidates should attempt not more than four questions.)

1. You are required to install a coke-grading plant to produce the following grades:
   (i) Up to ¾ in.
   (ii) ¾ in. to 1¼ in.
   (iii) 1¼ in. to 2 in.
   (iv) Over 2 in.
   (*a*) Sketch a suitable plant, including loading or storage hoppers, and indicate the materials of which the various parts of the plant are constructed.
   (*b*) If the coal from which the coke is to be made is unscreened coal containing 7 p.ct. of ash, state what approximate percentages of ash you would expect to find in the specified grades of coke.
2. (*a*) Sketch and describe a carburetted water gas plant.
   (*b*) Give the equations representing the reactions which take place in process of water gas manufacture.
3. (*a*) Describe the method of sampling a train load of coal in order to obtain a fair sample for testing.
   (*b*) How would you test the sample obtained for moisture, ash, and volatile matter?
   (*c*) Mention any type of coal with which you are familiar and state the results you would expect to obtain on testing this coal.
4. Explain the process of coal gas condensation, and describe with the aid of sketches an apparatus in which this process is carried out, giving the approximate temperatures of gas at the inlet and outlet of the condensers.
5. (*a*) Describe with the aid of sketches any stoking machine with which you are familiar.
   (*b*) What points in connection with the machine described require attention to maintain it in good order?

DIPLOMA GRADE.

PART I., from 2 p.m. to 5 p.m.

(Candidates should attempt not more than four questions.)

1. (*a*) Set out a table showing the more important dimensions and features of a horizontal retort installation or a vertical retort installation, each capable of producing 25,000 therms per day.
   (*b*) Sketch the cross-section of a typical "bed" of horizontal retorts or vertical retorts, marking the conditions of temperature and pressure at the various points which you consider to be desirable.
   (*c*) Write down a list of the different methods which are employed for heating retort settings and describe the essential differences of each type of producer.
2. Discuss the economics of low and high temperature carbonization in relation to the production of gas and smokeless fuel. How do you consider the disposal of the low-temperature tar products would be affected by the hydrogenation process?
3. Compare the qualities of horizontal, continuous vertical, and intermittent vertical coke, stating the advantages and disadvantages of each. What are the carbonizing conditions that tend to reduce the reactivity of coke? What are the desirable properties of a good domestic coke?
4. Describe the method of electrostatic precipitation of tar, giving its efficiency and the power absorbed. State at what point between the retorts and the purifiers you would recommend the installation of the de-tarrer, giving your reasons.
5. (*a*) Explain the calculation by means of which the amount and quality of coal gas and water gas produced when steaming vertical retorts can be determined.
   (*b*) Explain what is meant by "thermal balance" and "weight balance" in a gas-making process, and give typical examples for either coal or carburetted water gas practice.

DIPLOMA GRADE.

PART II., from 6 p.m. to 9 p.m.

(Candidates should attempt not more than four questions.)

1. (*a*) Describe and illustrate with sketches the principal features of a waterless holder. What are its advantages and disadvantages as compared with holders of the column and spirally-guided types?
   (*b*) State the principal items you would include in a specification for the excavations and foundations for a gasholder.
   (*c*) Give the more important provisions contained in the "Standard Conditions of Contract" as approved and recommended by the Institution of Gas Engineers and the Society of British Gas Industries.
2. Describe the recovery of benzole from coal gas by:
   (*a*) The wash-oil process.
   (*b*) The use of a solid absorbent.

Give sketches of the plant and discuss the relative advantages of the two processes.

3. (*a*) Give what you consider to be the most useful quality of gas that can be generally distributed for the economical production of light, heat, and power, stating the limits of inerts attainable in good manufacturing practice.
   (*b*) State the relative thermal efficiencies of coal gas and electricity in generation, distribution, and use for light, heat, and power.
4. (*a*) Enumerate and explain the various items in the balance-sheet of a statutory undertaking which enter into the cost of manufacture of gas and illustrate by figures.
   (*b*) Explain what is meant by "net cost of coal" and "net cost of gas into holder" and give typical examples.
5. Summarize shortly the principal provisions of each of the following Acts:
   (*a*) Gas-Works Clauses Act, 1847.
   (*b*) Gas-Works Clauses Act, 1871.
   (*c*) Gas Regulation Act, 1920.
   (*d*) Gas Undertakings Act, 1929.

GAS SUPPLY.

ORDINARY GRADE.

From 2 p.m. to 5 p.m.

(Candidates should attempt not more than six questions.)

1. Why is uniformity of gas pressure of great importance in gas supply? State some causes of pressure variation.

In what circumstances would you use governors on individual appliances in preference to service governors?

2. Compare with the aid of sketches the construction of a high-capacity meter with one of the " lights " type.

Explain any meter lubricating device you know of.

3. The following is an analysis of a town's gas:

	P.Ct.
CO_2	2·5
O_2	0·9
C_nH_m	2·4
CO	12·9
H_2	46·4
CH_4	25·9
N_2	9·0 – 100 p·ct·

State the properties of each of the constituents and show quantitatively their combustion reactions. With how much oxygen will 1 c.ft. of the gas combine?

4. Gas cookers with bottom flue outlets are now widely used. Explain fully why this is so.

5. Make a sectional sketch of a storage water heater. Describe its special features and give reasons for preferring it to an ordinary circulating system.

What is the approximate heat loss per hour from the apparatus when the storage is full of hot water?

6. Make a sketch of an outdoor cluster lamp. Explain how it is made weather-proof. Why is it important that mantles used on cluster lamps should be uniform in size?

Draw the approximate polar curve of the lamp you have sketched.

7. Gas appliances are sometimes fitted with flues and sometimes without them. Why is this? Give a sketch showing a good form of flue equipment for a geyser.

8. Sketch sections of the two types of stove generally used for japanning and other drying operations.

What steps are taken to reduce heat losses to a minimum?

How would you maintain constant temperatures in stoves of this kind?

HIGHER GRADE.

PART I., from 2 p.m. to 5 p.m.

(Candidates should attempt not more than five questions.)

1. Two places A and B, at the same altitude, are connected by a 6-in. main. There are no branches from the main between A and B and it is found that with a pressure of 6 in. W.G. at A and a flow of 6000 c.ft. per hour, the water gauge pressure at B is 3·3 in. (specific gravity of gas = 0·5).

(i) What would be the velocity of flow in ft. per second, with the same gauge readings and gas of the same specific gravity if B were 800 ft. higher than A?

(ii) What would be the velocity of flow in ft. per second if the specific gravity of the gas were changed to 0·4 in (i)?

Water may be taken as 800 times as heavy as air.

2. An estate of small houses is to receive at maximum demand 40,000 c.ft. of gas per hour from a gas-works 3 miles away, no other gas being supplied *en route*. Calculation shows that to maintain 6-in. W.G. at the estate either of the following schemes would meet the requirements:

(*a*) A 12-in. main with an initial pressure of 12 in. W.G.

(*b*) An 8-in. main with an initial pressure of 2 lbs. per sq. in.

(*c*) A 4-in. main with an initial preessure of 30 lbs. per sq. in.

What considerations would you take into account in selecting the most satisfactory of these schemes?

3. The following is an analysis of a town's gas:

	P.Ct.
CO_2	2·5
O_2	0·9
C_nH_m	2·4
CO	12·9
H_2	46·4
CH_4	25·9
N_2	9·0—100 p·ct·

State the properties of each of the constituents and describe scientifically what you would consider to be good combustion in gas fires, water heaters, and flueless stoves.

Explain " dissociation " in relation to the combustion of gas.

4. Make a sketch (in section) of a district governor. Explain how the governor reacts to variations in the inlet and outlet pressures respectively and show by an example how to ascertain the weight that must be added to increase the outlet pressure by ten tenths.

5. Explain with sketches any recording calorimeter you are acquainted with. Show how variations in atmospheric temperature, humidity, and pressure are compensated for.

6. What practical and scientific tests would you apply to a storage water heater to ensure safety, economy, durability, and reliability?

Give data showing results you would expect from a good type of apparatus.

HIGHER GRADE.

PART II., from 6 p.m. to 9 p.m.

(Candidates should attempt not more than five questions.)

1. A hall 80 ft. by 50 ft. by 20 ft. high is to be heated by flueless radiators, a temperature of 60° Fahr. (hall unoccupied) being required with 30° Fahr. outside.

Calculate the probable gas rate and the probable CO_2 concentration when stable conditions are reached, assuming that (*a*) the average heat loss through wall (including windows) to be 15 B.Th.U. per sq. ft. per hour and loss through ceiling and floor to be negligible, and (*b*) three air changes per hour.

Describe in detail with sketches how you would maintain automatically 60° Fahr. under all conditions.

Specific heat of air = 0·02 B.Th.U. per c.ft. per degree Fahr. and calorific value of gas = 500 B.Th.U. per c.ft.

2. A low-pressure street lighting installation not modified for 20 years is to be modernized. In submitting a new low-pressure scheme, what technical improvements can be introduced without increasing the gas consumption or moving the columns?

Draw the approximate polar curve of the modernized unit and show how to calculate the horizontal illumination at midspan point.

Support the case for gas as compared with electric light.

3. State what you consider are the outstanding features in gas fire design in recent years.

What evidence is there of the physiological value of radiation of certain wave lengths? How has this point been met by gas?

4. Making full use of your knowledge of ancillary subjects, describe the defects which might appear in a modern gas cooker due to—

(*a*) Faulty construction; (*b*) faulty adjustment; (*c*) neglect of maintenance.

5. State as fully as possible the various applications of the following controls and state what advantages result from the use of each:

(*a*) Clock control; (*b*) thermostat control; (*c*) pressure control; (*d*) volume control; (*e*) mixture control (air and gas).

Sketch one control.

6. (*a*) Describe with sectional sketches the main features of a furnace suitable, say, for the melting of brass, stating if low-pressure gas, high-pressure gas, or gas with air blast should be used and at what pressures. What burner system would you recommend, and why?

Can you give any figures of consumptions and times for melting metals?

or

(*b*) What is meant by " carburizing " and " case hardening? "

Gears 6 in. diameter and 1 in. thick have to be case-hardened. Make a sketch of a furnace suitable for the work, describe the operation, and state working temperatures.

What special controls might be used with advantage? Give reasons.

DIPLOMA GRADE.

PART I., from 2 p.m. to 5 p.m.

(Candidates should attempt not more than three questions.)

1. Write short notes on:

(*a*) Unaccounted-for gas,

(*b*) Distribution load factor,

(*c*) Reynold's Criterion, and

(*d*) Protection of mains and services from corrosion.

2. Several candidates are to be examined with a view to selecting a foreman to supervise work in connection with mains and services. Prepare—

(*a*) Five questions to be answered in writing by the candidates, and

(*b*) Five questions to be answered orally.

3. In what ways is the British Standards Specification for Street Lighting likely to influence street lighting generally and gas street lighting particularly? Have you any criticisms of the Specification? In referring to the Specification, with a copy of which you are provided, make use of the numbers of the pages and lines in the Specification.

4. A small gas undertaking is about to be merged into a larger adjoining one, the whole of the gas to be supplied by the larger undertaking. If you were instructed to supervise the changeover from the point of view of the distribution and utilization of the gas in the smaller area, what points would you take into account?

DIPLOMA GRADE.

PART II., from 6 p.m. to 9 p.m.

(Candidate should attempt not more than three questions.)

1. A hotel to contain 60 rooms is under construction. You are asked to advise on the provision of hot water and the warming of the building. State the various schemes you would consider and indicate, with reasons, the one you would recommend.

2. Describe in detail (with sketches, if necessary) any important piece of gas supply work with which you have been closely associated.

3. Write a scientific explanation of—

(*a*) The working of a gas-operated refrigerator,

(*b*) The destruction of furnace brickwork by contact with oxide scales from metals, and

(*c*) The internal corrosion of gas piping.

4. (*a*) What do you understand by the term " automatic mixture control " as applied to gas-fired furnaces and in what circumstances would you recommend such control?

(*b*) Figs. 1 and 2 [not reproduced here] are illustrations of two well-known types of these controls. Describe the working of one of them, making use of the letters in the illustration.

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

North of England Gas Managers' Association

The Annual General Meeting of the North of England Gas Managers' Association was held in the County Hotel, Newcastle, on Friday, May 6, when Mr. J. Corrigan, Engineer and Manager of the Penrith Gas Undertaking, read a paper on "The Sales Policy of a Small Gas Undertaking," and Mr. R. H. Duxbury, of South Bank, a paper entitled "400 B.Th.U.'s?" Publication of the contribution of Mr. Corrigan is held over till next week.

Mr. J. R. BRADSHAW, of the Hartlepool Gas and Water Company, the President of the Association, was in the chair.

The minutes of the previous meeting were confirmed, and the statement of accounts was taken as read.

Mr. A. C. HOVEY, President-Elect, of London, commented upon the soundness of the Association's finances, and said that there was now a large sum of money in hand. The Association had a strong reserve fund, but the amount accumulated raised the question whether something further should not be done in the matter.

The following new members were elected: *Members*—Mr. J. R. Cleator, South Bank; Mr. V. H. Donaldson, Newbiggin-by-the-Sea, and Mr. G. Le B. Diamond, York. *Associate Member*—Mr. A. O. Old, West Hartlepool.

The recommendation of the Committee that ten guineas be contributed to the Benevolent Fund of the Institution of Gas Engineers was approved.

On the motion of the PRESIDENT, it was decided to send a letter to Mr. W. M. Mason, late Manager of the British Commercial Gas Association, expressing the Association's regret that ill-health had necessitated his relinquishing his post with the Association, and conveying the best wishes of the members for the future.

400 B.Th.U.'s?

By R. H. DUXBURY, of South Bank.

It is becoming more and more difficult, when choosing a subject for a paper at the present time, to find matter which has not already been exploited.

When the President asked me to read a paper at this meeting, I immediately began to look round for something which had not been dealt with before, and which was likely to cause a considerable amount of discussion, as I am of the opinion that more good often comes from the discussion than from the paper itself.

I therefore embodied in my paper a question which I thought covered the above two points, and in talking the matter over with the President, he was of the opinion that such matter would at least prove likely to invoke a good discussion. Imagine my disappointment, therefore, when I read the paper given by Mr. W. J. A. Butterfield at the Joint Gas Conference at the British Industries Fair, Castle Bromwich, in March this year, which covered the very ground on which my thoughts were turning—namely, the standardization of calorific value.

Admittedly, Mr. Butterfield covered the subject much better than I could have done, but I must admit my disappointment in being forestalled when I had my paper almost completed. I should have felt very diffident about mentioning the matter at all now, except that the President will bear me out, in acknowledging that I discussed this matter with him, detailing my various points, long before the publication of Mr. Butterfield's paper.

In the circumstances therefore, as it was no use covering the ground twice, it has been necessary for me to re-write the paper in a comparatively short time, as the printer wished to have it early in April.

TO THE SMALLER UNDERTAKINGS.

Over 75 p.ct. of the gas undertakings, in the area covered by the North of England Gas Managers' Association, make less than 200 million c.ft. of gas per annum. Taking this into consideration, I am sure the Engineers of large works who are present will forgive me if my remarks are of more interest to the Engineers of the small or moderate sized undertakings, because the outlook of the two must be very different. Whereas one can spend considerable sums of money, more or less experimentally, on new plant, which may only be a small part of the whole unit, the other must go very slowly and cautiously, so as to get the utmost value from any expenditure, knowing that in his case it is probably for the whole unit and not for a part thereof.

I propose to confine my remarks chiefly to the production (with special reference to complete gasification), and distribution of gas, such as is supplied at South Bank, the declared value of which is 400 B.Th.U. South Bank is by no means alone in supplying this calorific value, and there are a number of undertakings supplying lower calorific values.

During the war, and more particularly during the coal dispute of 1926, much was heard of what is generally referred to as "low-grade gas," though I personally consider such an expression a misnomer. Grade implies quality, whereas calorific value is the heating value of unit quantity, and not the quality, efficiency, or suitability of a gas for general purposes. A gas may have a low calorific value and yet give better efficiency than one of higher calorific value, provided its inert content and specific gravity are kept within reasonable bounds.

COMPLETE GASIFICATION.

During the war years and up to, say, 1925 complete gasification seemed to be gaining some headway, particularly for small undertakings, and while a number of Engineers discarded these plants, my experience was that the plants of which I then had charge, gave satisfactory results, as far as they went.

The history of complete gasification is, I think, something of a puzzle to the profession, as little was heard of the process until the war period, and shortly afterwards. During this time a number of plants were installed, many of which appear to be still in useful service, while others have been superseded for various reasons.

I myself have been puzzled over this somewhat erratic development, but, from investigation, it appears to me that complete gasification was attempted long before the Industry was in a position to change its general methods and procedure. Whereas many patents were taken out for complete gasification, and numerous plants appear to have been put forward in the early years of the present century, it must be remembered that at that time all the gas undertakings in this country were bound by the hard and fast rules and regulations of the Illuminating Power Standards; and as the advantageous use of complete gasification of necessity reduced the illuminating power of the gas, it was obviously impossible for undertakings to adopt this process to any great extent.

With the war period, however, and the necessity for producing as much gas as possible per ton of coal, it was acknowledged that the Illuminating Power Standards must go, and with the advent of the calorific standard there has been a greater opportunity for the development of complete gasification methods.

Personally, I feel that the Industry is still too largely governed by the old practices, which were developed for the production of gas to suit flat flame burners.

However, reverting to my remarks on the history of complete gasification, I was extremely interested some little while ago, when shown an extract of a patent taken out by Brooman in 1868. This embodied a combination of two water gas generators, and a bed of horizontal retorts, the combination being such that the blow gases of the one producer heated the retorts, while the other producer was making water gas, and *vice versa*.

I am afraid I am insufficiently versed in patent history

to know to what extent different schemes and combinations were attempted before the beginning of the present century. I have, however, seen extracts of some 30 to 40 English patents prior to 1900, covering complete gasification in one form or another, and this list must be comparatively small as no American or Continental patents were included.

It is indeed interesting, in the light of these patent specifications, to realize that some of our present day developments were conceived, in principle, by our predecessors in the Industry. Some of these were men whose names have hardly carried beyond their day, and yet they were capable of thinking out possible combinations, which we today are only just beginning to put into practice. Most of these pioneers were undoubtedly before their time, as with the demand for illuminating gas it was obviously impossible for a non-luminous, or only partly luminous gas, to come into any extensive use.

I think there is little doubt that one of the factors which led up to experimenting with complete gasification was the question of the coke market; and I suggest that this to-day is more acute than ever. It may be argued that, with improvement in trade conditions generally (and therefore a larger demand for coke), the coke position will improve; but, personally, I feel that the opposite will be the result.

At the present time there are numerous coke oven plants closed down, and I believe that very large installations of proposed coke ovens are only being held over at the present time purely on account of the unsatisfactory trade conditions.

Coke ovens being in large units, usually at the pit head, are laid out and equipped for the large scale production of coke. In these circumstances they are likely at all times to be able to produce well-graded coke at such a price that small undertakings, at any rate, cannot possibly do profitably.

Since 1925 a number of papers have been read dealing with various types of complete gasification plant, but in each case, with the possible exception of the "Tully" system, there does not appear to have been any further great developments of any of these plants.

Even the Tully system seems to have had a very chequered career. It was, I think, originally marketed, not as a complete gasification plant, but as a water gas generator adapted for the cracking of tar and other hydrocarbons. This early plant suffered from the same general disadvantage of its day, in so far as it did not produce a highly luminous gas. I think it would be right to say that the "Tully" plant, as a complete gasification apparatus, only commenced its career, and that to a very limited extent, during the war years. It was not until after the war, so far as I can recollect, that any appreciable number of these plants were put into service.

Where is the "Snag"?

In connection with complete gasification, therefore, one is inclined to ask, Where is the "snag"? Why was it that the headway made immediately after the war with complete gasification was not maintained?

I think the answer to these questions is that most of the plants installed in the immediate post-war period, were put down for the express purpose of working in conjunction with horizontal retorts. Others were put down as a temporary means of making gas while the carbonizing plant, worn out during the war period, was being reconstructed. So far as I know, all these plants were of the hand-operated type, and where they were put down to work in conjunction with horizontal retorts, especially in the case of the smaller and medium sized works, there was no saving in labour; in fact, in many cases it involved extra labour charges.

The obvious inference is that such plants must be mechanically operated, but this I shall mention elsewhere.

Two Disadvantages.

It would appear that there are two disadvantages to complete gasification: First, that good and suitable non-swelling coal must be used if the best results are to be obtained. Secondly, that if a higher calorific value than that obtained with complete gasification alone is desired, it is necessary to have recourse to some form of enrichment.

With regard to coal, there are, of course, differences of opinion, but my personal view is that whatever type of carbonizing plant is used, it is more efficient and economical to use good coal. The possible exception being in the case of undertakings which are near enough to collieries for the carriage to be negligible, and where the cost of small slack coal may be so low as to allow of its being used more economically. In making this statement, I am basing my views on personal experience gained at six different works, having installed four vertical plants, five horizontal machine charged plants, and two complete gasification plants.

In the case of vertical retorts and complete gasification plants, I think there is no question about the class of coal, and although the position with regard to horizontal retorts is, I admit, somewhat different, I am still of the opinion that until means are found, and put into operation, whereby the coal is thoroughly cleaned at the colliery, it pays to use good coal. There is much to be said in this respect for the proposal that coal should be bought on analysis and calorific value, though it is, I admit, difficult to formulate practical means to accomplish this.

I have not heard of it being done, but it would be very interesting if some undertaking, which at present uses a poor-grade slack coal, would take a supply of good suitable coal, or *vice versa*, for twelve months, and draw up a balance-sheet of the results. I feel convinced that this would show that far too much is made of low coal costs.

Calorific Value.

Relative to the second point—viz., calorific value—there is probably more divergence of opinion respecting this than there is with regard to coal. For instance, one is rather at a loss to understand why, in an industrial district, such as the Leeds-Bradford district to take a typical example, the calorific value of ten of the large and moderate sized undertakings in a very small area should distribute gas of the following values: 400, 440, 470, 475, and 500 B.Th.U.

Referring to Mr. Butterfield's paper, if calorific values were standardized into three or four qualities throughout the country, I certainly think the quality produced by complete gasification should be one of these, so that it would be a much simpler matter for Engineers to contemplate complete gasification.

While mentioning this question of calorific value, I think emphasis might with advantage be laid upon the importance of composition and pressure. It is not difficult to visualize the position of gas undertakings having carburetted water gas plants installed. In these cases, I feel sure that it must be the exception to use these plants to give a definite percentage of water gas all the year round. It is more than likely that such plants will be worked to suit the demand for gas and the coke market, with the result that the composition of the gas is an ever-changing one, although the calorific value remains the same. I am perfectly sure that there will be far more cause for dissatisfaction in these cases than where the calorific value is varied without greatly affecting the composition of the gas.

Varying Pressures.

Relative to the question of varying pressures, I am afraid it is still too often overlooked, in the average distribution system with its continually changing rate of flow, depending upon the hour of the day or night, that there is considerable variation of pressure at the consumer's meter, particularly in the outlying districts; and that a lot of the adjustment troubles, too often attributed to calorific value, are really due to varying pressures.

If standard qualities of gas were inaugurated, there would no doubt be a saving on the manufacturing cost of gas appliances, owing to the possible fact that gas and air regulators would not then be required, and this saving, or part thereof, would be well invested in installing a consumer's governor as an integral part of every distribution system; and in connection with this, here is a point for meter manufacturers. Why cannot a built-in governor be included as "part and parcel" of the meter? This would necessarily have to be in such a position as would give easy access for alteration of pressure, or renewal of parts, and the size would, of course, be governed by the size of the meter.

I feel that it ought to be possible for this to be done at a very reasonable cost, and I am sure the results would more than justify the small additional outlay.

While at Batley, the calorific value of the gas supplied was 440 B.Th.U., and I was quite satisfied that this calorific value was in every way suitable for all purposes, domestic and industrial, and there were never any complaints with regard to the quality of the gas supplied.

When appointed to my present position, I found the declared calorific value of the gas to be 400 B.Th.U., approximately 25 p.ct. of the gas being made on horizontal retorts and 75 p.ct. on complete gasification plants. The plant installed consists of a bench of four regenerative settings of six through horizontal retorts 24 in. by 16 in. by 20 ft. long, machine charged; and two Tully complete gasification plants.

Although the make of gas at South Bank is over 130

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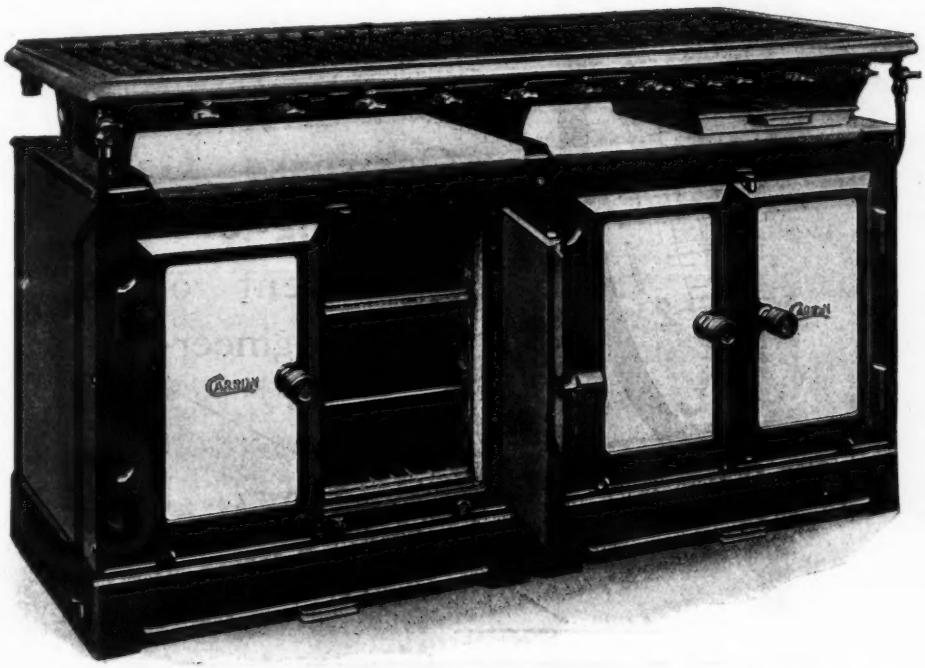

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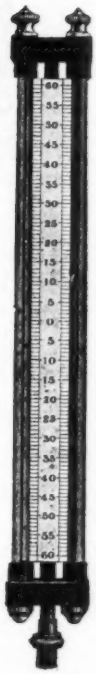

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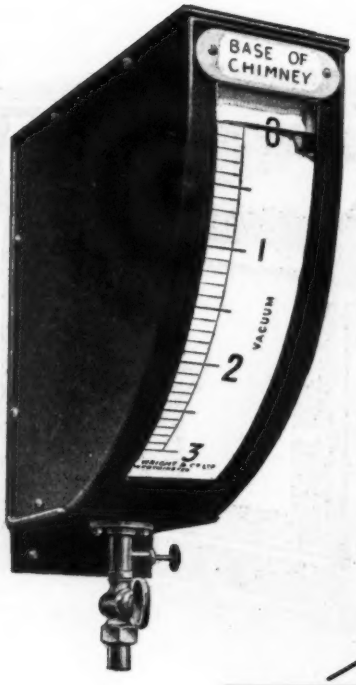

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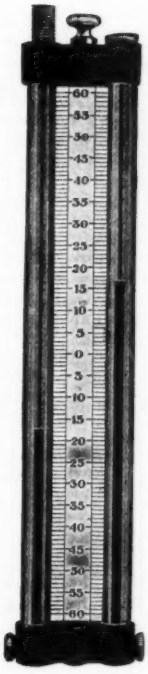

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million c.ft. per annum, only one regenerative setting is in use for eight months in the year; two settings being used for the remaining four months. It will be seen, therefore, that the complete gasification plant is doing a good share of the work.

The particular plant now working was installed in 1920. This was recently re-lined, and a new wash-box and mechanical operator added, and it is interesting to note that the output of the plant has been thereby increased by at least 25 p.ct., and whereas three men (one per shift) were previously employed on the plant for the whole of their time, they are now only employed on this work for half their time, the remainder being spent on other duties outside the Tully house. While on the plant, their duties include the elevating of the coal from the coal bunkers underneath the railway siding, clinkering, cleaning, &c.

Unfortunately, up to the present time the plant has not been fitted with overhead charging arrangements, as this necessitated the lifting of the roof; but this is receiving attention at the moment, and will result in further reduction of operating costs, and also give an increased output of gas from the plant.

Efficiency of Mechanical Operator.

I would like at this point to state most emphatically that the adoption of the mechanical operator, waste-heat boiler, and other improvements and refinements, have undoubtedly altered the whole question of complete gasification. The majority of the labour costs are eliminated, and much more uniform results are obtained, thus giving more all-round efficiency.

The mechanical operator is of an extremely simple design, consisting of one single camshaft, to which are coupled all the operating valves of the plant, so that the sequence of operating is definitely fixed. The camshaft is, in turn, operated by a simple form of timing gear which is readily adjustable to give the cycle of working most suitable to the fuel being carbonized. The operator is driven by means of a small steam engine the governor of which ensures that the duration of cycle and the timing of the movements are accurately repeated.

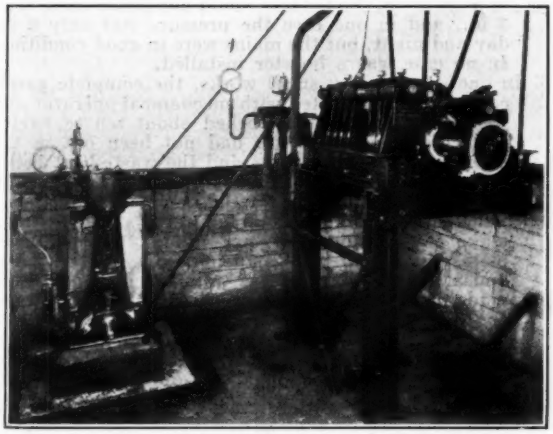


Fig. 1.—General arrangement of Mechanical Operator and Engine.

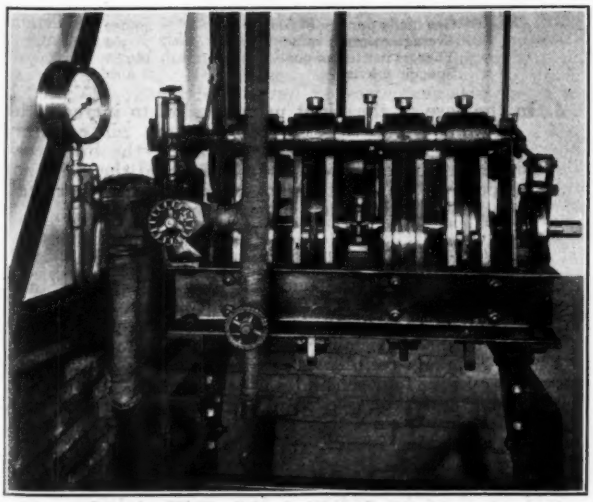


Fig. 2.—Mechanical Operator, showing Main Shaft carrying Cams for Operating Levers; also Steam Valve for Plant, on left.

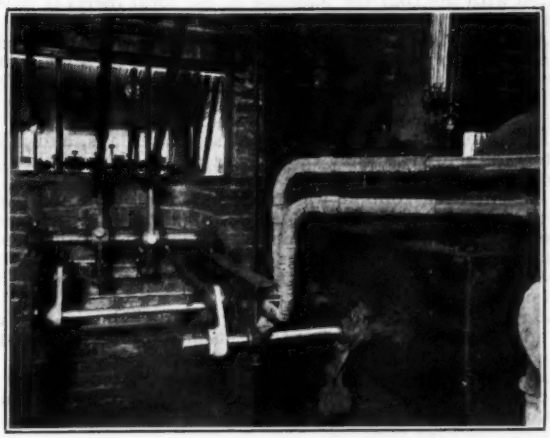


Fig. 3.—Showing Levers operated by the Mechanical Operator: from left to right: Up Run, Snift, Blast Valves, Down Run; also new pattern Wash Box on right, and Steam Pipes to top and bottom of Plant.

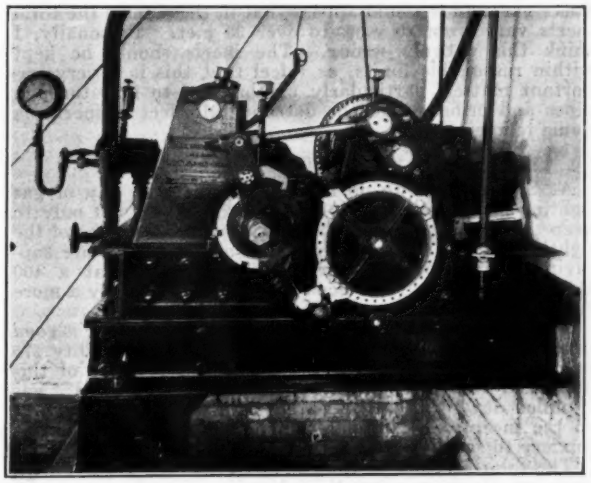


Fig. 4.—Showing Notch Wheel on Main Shaft, and Timing Wheel: Automatic Poker drive: Air Cock for shutting down Plant, and Lever for speeding up Air Blower.

Results at South Bank.

The following are the results obtained at South Bank for January, February, and March this year, since the relining of the generator and the addition of the mechanical operator, &c.

Gas made per ton of coal	25,147 c.ft.
Calorific value	400 B.Th.U.
Therms made per ton of coal	100·588
Coke made for sale per ton of coal	4·16 cwt.
Tar made for sale per ton of coal	10·66 gallons.

Average Analysis.

—	Town Gas.	Tully Gas.
	P.Ct.	P.Ct.
CO_2	5·1	5·3
O_2	0·3	0·2
CO	28·5	34·0
C_nH_m	0·4	0·3
CH_4	10·9	5·5
H_2	50·7	50·7
N_2	4·1	4·0
	100·0	100·0
Total inerts	9·5	9·5
Specific gravity	0·495	0·519

I would like to point out here that the calorific and analysis tests are carried out regularly and systematically. A Boys, a Wright's, and recording calorimeters are in regular use.

In connection with the above analysis, I think you will

agree with me that the question of the total inerts is most satisfactory.

As I felt that I should like to have these figures confirmed before publishing them, I approached the President, Mr. J. R. Bradshaw, of West Hartlepool; and Mr. C. F. Blincoe, of Middlesbrough; and they very kindly put at my disposal the use of their chemists and apparatus.

Independent tests were made on separate days, and it is interesting to note that the results obtained very closely approximated to our average analysis given above.

The nitrogen content was the figure that I wished particularly to have confirmed, and one of the tests carried out was for the nitrogen content only. The apparatus used was the South Metropolitan nitrogen apparatus. Two tests were made, and in each case the figure was exactly 3·8 p.ct.

May I, at this point, express my personal thanks to Mr. Bradshaw, Mr. Blincoe, and their chemists, for their assistance regarding the above analysis.

The 400 B.Th.U. quality gas supplied is quite satisfactory in every way for both our domestic and industrial loads, but I would again emphasize the fact, that the total inerts in the gas are kept very low.

Dilution of Straight Coal Gas.

I notice there has been some correspondence recently with regard to the dilution of straight coal gas with producer gas, and it would appear that in these cases the total inerts vary from 20 p.ct. to over 30 p.ct. Personally, I think this entirely wrong. The inerts should be kept within reasonable limits, as I feel that this is a very important matter, particularly with regard to flow through pipes and orifices, and the detrimental effect of inerts on flame temperature.

Lighting.

At South Bank we do not believe that the day of gas lighting is passed. Every endeavour is made, not only to keep the existing lighting, but also to win back some of the lighting lost. From my experience of the gas we are supplying I say without fear of contradiction that a 400 B.Th.U. gas will give as good a light, and certainly a more trouble-free one, than gas of a higher quality.

A casual glance at an incandescent mantle using a *good* quality 400 B.Th.U. gas, compared with a *bad* quality 475 or 500 B.Th.U. gas will illustrate the correctness of this assertion. By *bad* quality, I mean a 550 B.Th.U. gas "pulled down" to 475 B.Th.U. or less, intentionally, due to the incentive of competition between shift foremen or anxiety to save 0·00001d. in purification costs.

The calorific value of the gas at Batley was 440 B.Th.U.; at South Bank it is 400 B.Th.U. Now it only requires a further similar drop of approximately 40 B.Th.U., to give a gas which can be obtained by complete gasification, and to my mind this would be ideal carbonization, at any rate from the standpoint of the small and medium sized works. If this could be done, there would undoubtedly be a saving on existing manufacturing costs, particularly when capital charges for new plant are taken into account.

The ideal policy for complete gasification must be to close down the retorts altogether, and in such circumstances it is necessary to adopt one of two alternatives. Either the calorific value of the gas supplied must be reduced to the calorific value which can be obtained from existing complete gasification plants, or the plants must be modified so as to give a gas of higher calorific value than is at present obtained.

It seems evident from a careful consideration of complete gasification, that it is impossible to produce regularly, *and with efficiency*, gas of more than 350 B.Th.U. without enrichment; but from the experience I have already gained, I can see no reason why the calorific value should not be reduced to that figure. I am quite satisfied that such gas is fully capable of giving equal satisfaction to the gas now being supplied—viz., 400 B.Th.U.—provided, as before mentioned, the inerts are kept within reasonable limits.

Distribution.

It might be as well at this point to touch on the subject of the distribution of this lower calorific value gas. Much against the general consensus of opinion, in no single case have I known it to be necessary to increase the size of mains, services, &c., except where such were obviously much overloaded for any usual quality of gas.

With regard to meters it is the general opinion that a low calorific value gas will have a deleterious effect on meter diaphragms, but the investigations I have made do not confirm this.

In taking this matter up with a meter firm, who repair meters for a works sending out gas of 350 B.Th.U., made solely by complete gasification, I was assured that the condition of the meters from the works in question was certainly no worse than the average. In fact, they were in better condition than some meters received from works sending out gas of a very much higher calorific value.

It might be interesting to note that two meters were recently brought into the works, one 48 years old and the other 50 years old, and as far as we can trace neither meter had ever been previously repaired, although tested several times. Gas of a calorific value of 400 B.Th.U. has been supplied for at least eleven years.

The stuffing box of one of these meters was leaking. This was re-packed, and upon test the meter was found to be registering accurately. The other meter required no repair and was also registering accurately. Although it is not a practice which we adopt, or that I recommend, these meters have, after official test, been put out on the district again for further observation.

To prove that these cases were not exceptions, we have recently opened up a number of meters over 25 years old, and found the diaphragms to be sound.

Works Supplying All Tully Gas.

I have recently visited several gas undertakings in England, Scotland, and Ireland supplying all "Tully" gas, and at only one of these was the gas enriched in any way, and in this case 0·66 of a gallon of oil per 1000 c.ft. was used to bring the gas to 415 B.Th.U.

In the majority of these works it must be admitted that, as tests for calorific value and analysis are not carried out systematically, it is impossible to obtain reliable data on which to form any conclusions, but the information obtained was of such an interesting nature that I could have given a paper on the subject of these visits alone.

The chief points which struck me, however, were as follows:

1. The fact that 350 B.Th.U. gas gave every satisfaction after the appliances, &c., had been properly adjusted to give their maximum efficiency with that quality gas.
2. That, with the change over to all "Tully" gas, it was not necessary to increase the pressure. In fact, in most cases, the holders would not throw more than 3 in., and in one case the pressure was only 2 in. day and night, but the mains were in good condition. In no case was a booster installed.
3. In one case, a very small works, the complete gasification plant was fitted with mechanical operator and waste-heat boiler, and worked about ten to twelve hours per day. The fire had not been out in the plant for eighteen months and the waste-heat boiler had not been touched in any way, or the standby boiler brought into use for the same length of time.
4. In the case of one of the larger works visited, with a make of 60 million c.ft. per annum, the new complete gasification plant had not been long at work, and a small amount of gas was therefore still being made on the horizontal hand fired, stop-end retorts. In this case tests for calorific value, analysis, and specific gravity were carried out regularly, and it was possible to obtain very interesting data. The complete gasification plant was quite up to date in every way and fitted with mechanical operator and waste-heat boiler, and the gas was registered through a separate wet meter. The results in this case, from the complete gasification plant, for February and three weeks in March to the time of my visit, were as follows:

Gas made per ton of coal	46,930 c.ft.
Average calorific value	362 B Th U.
Therms per ton of coal	169·88
Specific gravity	0·52

5. In the case of the plant using gas oil to increase the calorific value to 415 B.Th.U., the oil certainly seemed to be well cracked and fixed, the brickwork in the carburettor was quite clean, and there did not appear to be any trace of oil at the scrubber seal, the relief holder inlet, or elsewhere.

Costs.

Now the "proof of the pudding is in the eating," and the question one must ask is "What about the cost?" "Does it mean that the consumer is going to pay less per therm for his gas of a lower calorific value?"

I have gone as carefully as possible into this matter, and for answer I give four schedules of costs for gas into holder, basing my figures on the plant which we have installed. These costs are for a works, the size of South Bank—viz., 582,000 therms per annum.

I have not dealt with vertical retorts because in our case if it were necessary to increase the present retorts this would be done by adding a few more settings, coal bunkers, &c., to our existing horizontal installation which is already equipped with a charging and discharging

machine, coal elevators, gas-engine driven electric generators, &c.

As I know there is much difference of opinion as to what items should be included in cost into holder, I have defined these as far as possible.

I have not included any figures for capital costs, as it would be difficult to obtain these. There is, however, no question that the capital costs for a complete gasification plant would be very much smaller than for any other efficient carbonizing system.

Cost per Therm in Holder.

	100 P.Ct. Horizontal Gas.		25 P.Ct. Horizontal. 75 P.Ct. Tully. (Approximate.)		100 P.Ct. Tully.		100 P.Ct. Tully and Waste-Heat Boiler.	
	68 Therms per Ton of Coal.		100·6 Therms per Ton of Coal.		160 Therms per Ton of Coal.		170 Therms per Ton of Coal.	
	Pence.		Pence.		Pence.		Pence.	
Coal at £1 per ton	3·529		2·385		1·500		1·411	
Labour, stokers, and operators	0·595		0·343		0·128		0·128	
Labour, boilers	0·152		0·152		0·152		0·043	
Boiler fuel and gas for engines, horizontals	0·296		0·615		0·768		0·153	
Water on boiler	0·030		0·063		0·071		0·071	
Purification	0·080		0·080		0·080		0·080	
Salaries	0·190		0·190		0·190		0·190	
Maintenance	1·210		0·900		0·500		0·500	
	6·082		4·728		3·389		2·576	
Less—								
Coke at 17s. 6d. per ton	1·544		0·579					
Tar at 2d. per gallon	0·294	1·838	0·198	0·777	0·125	0·125	0·117	0·117
Total	4·244		3·951		3·264		2·459	
Total cost for Tully gas carburetted to 400 B.Th.U., using ½ gallon of oil (at 4d. per gallon) per 1000 c.ft.					3·356		2·651	

I am indebted to the Engineers of those works which I visited for the courtesy extended to me and for the most useful information obtained. Also I should like to thank my staff for their assistance in the preparation of this paper.

In conclusion, "What of the future?" Although this paper is headed "400 B.Th.U.?" I am inclined to ask what the heading might be in another year or so. Of one thing I am certain, the last word has not yet been said with regard to complete gasification.

Discussion.

The PRESIDENT, opening the discussion, remarked that it was not true to say that selling was nowadays the biggest thing in the Gas Industry, any more than it was true to say the same of any other department. The strength of the Industry must be tested by its weakest link, and it was not a question of one department overshadowing another. The author had referred to a revival in the heavy steel industries, but he thought that a revival might only increase their coke troubles. The tendency to-day was to bring the coke oven to the steel plant, so that coke might have to bear rail transport costs which would affect prices. He had recently had a conversation with an engineer of a big plant in Durham who had told him that if the present price of coke could be maintained he would be quite prepared to put down new plant and sell the gas to him for 6d. per 1000 c.ft. He had seen some of the plant to which Mr. Duxbury had referred, and he could only describe it as uncanny and unfailing in its accuracy. When Mr. Duxbury had submitted his inerts figures both to himself and to Mr. Blincoe, they could hardly believe them. Many men would be pleased if they even got double what he was getting, but they had gone into the figures, and had had them analyzed. People, however, thought they were getting a bad gas if it was brought down from 600 B.Th.U. to 500, or 500 to 400, and customers were apt to be suspicious. Many of them in charge of gas undertakings perhaps shirked the risk of the change. In his own particular case, he was convinced that if he were to-morrow to reduce the quality from 500 B.Th.U. to 400, he would at once throw away one-fifth of his purification and storage plant. That might be contested, he knew, but he also had to find a place where gas at 400 B.Th.U. was being sold at a lower price per therm than gas sold at 500 B.TH.U.

The Vital Question of Cost.

Mr. C. DRU DRURY, of Sunderland, said that Mr. Duxbury would not misunderstand the meaning of the term when he referred to his gas as low-grade gas. He only referred to type of gas, and in dealing with low-grade gas Mr. Duxbury had ventured upon a big field. He asked where was the snag. One snag was that special coal was necessary, and this was naturally an expensive matter; nor could everyone get it, and then it was necessary to enrich, which was a nuisance. Then there was the question of plant. They might have storage sufficient for 20 hours, but that was reduced to 16 hours at 400 B.Th.U. Mr. Duxbury had spoken reassuringly on the question of distribution, but in spite of this he was of the opinion that gas of 400 B.Th.U. could not be distributed with a delivery of the same therms through the same mains as were used for 500 B.Th.U. gas. The inerts figures of Mr. Duxbury were extraordinarily low, and it was a surprise to him that complete gasification could make a gas with under 10 p.ct. of inerts. The vital question was, Did complete gasification pay, and could they make gas cheaper that way than they were doing at present?

Mr. J. E. BLUNDELL, of Carlisle, said that it was necessary to pass 25 p.ct. more gas at 400 B.Th.U. than with 500 B.Th.U., and this was a serious difference. One answer to Mr. Duxbury's question of where was the snag was that the promises made had never been fulfilled. The people who had originally gone in for Tully gas plant had it no longer. Another difficulty was the question of special coal, only a limited number of qualities being possible.

Mr. C. F. BLINCOE, of Middlesbrough, said that the analysis which the author had referred to as having been carried out by himself and the President only dealt with inerts. He had looked up a list of some 14 undertakings selling 100 million c.ft. and had examined the prices, and he found that these ranged from 9d. to 1s. 6d. per therm; and that seemed to show that there was some relationship between quality and price. It might be argued that a low-grade gas was more efficient in use, and that if more was charged per therm the consumer made up in that direction. That was one point about reducing the price per 1000 c.ft. It was not an extraordinary thing if no mention was made about the thermal price.

Need for a Relief Holder.

Mr. H. LEES, of Hexham, said that it ought to be borne in mind that Mr. Duxbury did not suggest that low-grade gas should be applied generally, but rather by the smaller undertakings. He agreed with Mr. Blundell when he said that the snag was that it had not delivered the goods. One of the drawbacks to the Tully plant, and perhaps one of the reasons why more progress had not been made, was the need for a relief holder. When some of the difficulties mentioned had been overcome, then perhaps that type of plant might be introduced to some extent.

Question of Coal Supply.

Mr. A. C. HOVEY, of London, said that, according to Mr. Duxbury's analysis of Tully gas, the calculated calorific value was 333 B.Th.U., which was 17 B.Th.U. less than the 350 figure mentioned as the maximum which could be produced efficiently and regularly without enrichment. That 333 quality was only 11 p.ct. above the value of blue water gas produced from coke. Mr. Duxbury apparently used good, non-swelling coal, which he regarded as essential to the success of the process. He agreed that low ash content was advantageous, but that the coal must be non-swelling restricted the choice and tended to higher coal prices, but no doubt such good coals largely prevented clinker troubles and the fusing of refractories. To tie down gas manufacturers to calorific values which would not be best suited to the coals most economically available, and to the plant, would be, in his opinion, against their efforts to reduce the price of gas. The Industry did not desire, he thought, restrictive and destructive standardization. It was doing its best to secure proper freedom in keeping ahead of its competitors. Less than twelve works in England, and the same number in Scotland, were making gas of 400 B.Th.U. or less. He agreed with Mr. Duxbury that satisfactory results were obtainable with these qualities providing adjustments of apparatus were made and that mains and services were of adequate size.

Author's Reply.

Mr. DUXBURY, replying briefly to the discussion, said that there was no great difference between gas at 400 B.Th.U. with a low inerts content and other gas with between 20 to 30 p.ct. inerts. As to the figures he submitted, the tests had shown the actual calorific values, and he could say no more than what had already been said. Mr. Blundell had referred to pushing 25 p.ct. more gas through the mains. It had to be remembered that in that gas they were not just pushing gas through the mains, they were pushing inerts. He submitted that the promises made were being fulfilled, but not the ridiculous things that were said of the process when it first appeared. Again, they could not compare the installations of to-day with those of ten or twelve years ago. They could not compare the results of the complete gasification plant of to-day with those of the same plant ten years ago. He might add that the coal used in the plant was Durham coal, and it had cost about 78s. a ton delivered. Another factor was capital costs, and the gasification plant was cheaper when extensions were considered when compared with extensions to, say, horizontal retorts.

Vote of Thanks.

Mr. HEDLEY HOY and Mr. P. M. WATSON proposed and seconded respectively a vote of thanks to the authors of the papers, which was carried heartily.

Election of Officers.

The following Officers were elected:

President.—Mr. A. C. Hovey, of London.

[Mr. Hovey, after two years under Sir Robert Hadfield, at Sheffield, served his articles with Messrs. John Abbot & Co., Ltd., of Gateshead, and subsequently was appointed Assistant Engineer and Manager of the Tynemouth Gas Com-

pany. After eleven years in the service of that Company, he was appointed Chief Engineer to the Milan Gas-Works, and later returned to England to join Messrs. West's Gas Improvement, Company, Ltd., of Manchester. Mr. Hovey has travelled all over the world in the course of his career in the Gas Industry. He has been a member of the Association for 35 years, and is a member of the Institution of Gas Engineers.]

Vice-President.—Mr. A. Pickering, of South Shields.

Committee.—Mr. J. H. Curry, of Sunderland; Mr. N. Reid, of Gateshead; and Mr. T. Law, of Malton.

Mr. Hovey presented Mr. J. R. Bradshaw, the retiring President, with a Presidential Certificate commemorative of his year of office.

Mr. C. WOOD proposed, and Mr. H. GALLOWAY seconded, a vote of thanks to the President and Committee.

Eastern Counties Association at Yarmouth

PRESIDENTIAL ADDRESS OF MR. P. D. WALMSLEY, B.Sc. (see last week's "JOURNAL").—GAS METERS AND THEIR RELATION TO UNACCOUNTED-FOR.

PHOTOGRAPHED ON THE BOWLING GREEN AT THE GREAT YARMOUTH GAS-WORKS.

A peculiarly penetrating "nor'-easter" supplied an exact contrast to the warmth of the welcome extended by the Chairman and Directors of the Great Yarmouth Gas Company and their esteemed Managing-Director and Engineer (Mr. P. D. Walmsley), who is President of the Eastern Counties Gas Managers' Association, to the large number of members who journeyed to that historic seaport for their half-yearly meeting on Wednesday, May 4. The rendezvous was, of course, the gas-works, where the President greeted the visitors and introduced them to the Chairman of the Company (Mr. C. Somerville Orde, J.P.), the Deputy-Chairman (Mr. A. Preston Rising), and others of his fellow Directors.

THE GAS-WORKS.

An inspection was then made of the works, which have behind them a long history of usefulness, and in front of them, we are certain, an equally, if not more, prosperous era. The Great Yarmouth Gas Light and Coke Company was formed under a Deed of Settlement in November, 1824, and it was in that month that gas for public and private lighting was first supplied in Yarmouth. Twenty-one years later, in 1845, a new Company was formed for the purpose of carrying out the existing contracts or arrangements, and in 1863 this Company was incorporated by a Special Act of Parliament.

The situation of the works, adjacent to the east bank of the River Yare, is advantageous for receiving sea-borne coal, while there are railway sidings opposite the main works entrance for inward and outward goods traffic. A hydraulic crane (working pressure 750 lbs. per sq. in.) at the quay side deposits the loaded coal-skips into horse-drawn vehicles which convey them to the works, where the coal passes through a breaker and is elevated to a band conveyor running the length of the coal store. Twin bucket elevators serve the coal storage hopper above the retort house. There is a band conveyor under the floor of the coal store so that coal may be taken from any part of store. The carbonizing plant (by Gibbons Bros.) comprises one bench of five settings and one bench of three settings. Each setting is of six 20 ft. through retorts in three tiers. The silica segmental retorts are 24 in. by 18 in. flat D section. Each setting is provided with a self-contained producer fitted with "Grille Grate" furnace. The regenerators are Gibbons deep cellular system, and are provided with graduated firing control. There is a "Guest-Gibbons" charger-discharger. There is also a Humphreys & Glasgow carburetted water gas plant. With regard to other apparatus, reference to the Holmes gas de-hydrating and naphthalene removal plant will be found in the President's address.

The inspection concluded, and the photograph secured, light refreshments were partaken of in the Company's Social Club, and then followed an inspection of the up-to-date showrooms and of the meter repair shops, which are also fully dealt with in the address of the President.

GUESTS OF THE GAS COMPANY.

Later, members and friends to the number of over one hundred, were the guests of the Gas Company at lunch in Arnold's Restaurant, with Mr. C. S. Orde, the Chairman, presiding. An excellent meal was enjoyed, which Mr. Spencer Arnold (a Director of the Company) explained subsequently had been cooked entirely by gas—"which was found to be completely successful."

The toast of "The Great Yarmouth Gas Company" was submitted by Alderman H. T. Greenacre, J.P., Deputy-Chairman of the Great Yarmouth Water-Works Company, and a former

Director of the Gorleston and Southtown Gas Company. He said that regular tests were made of the gas at Yarmouth, and never had there been occasion to report that the calorific value had fallen below its proper standard. Advances had been made in the production and distribution of gas equal to those in connection with any other commodity supplied to the public. In 318 towns there were 13,000 miles of streets lighted by gas and only 3000 by the other illuminant. As to the "Regulo" controlled cooker, this was so accurate in its results that it almost seemed it had the power to think. The Great Yarmouth Gas Company had always kept themselves to the front, and in Mr. Walmsley they had an Engineer who was at the head of his profession, and who was fully alive to the necessity of giving the best service. In their Chairman, too, the Company were particularly fortunate. In his response, Mr. Orde remarked that the Company did everything possible to give their customers the best service. They recognized that service on the most comprehensive scale was to-day the only means of carrying on business successfully.

"The Town and Trade of Great Yarmouth" was proposed by Mr. Frank Prentice, of Ipswich, who said it was interesting to note that Mr. Harry Townsend, M.Inst.C.E., late Managing-Director of the Wakefield Gas Company, and father of their present member, Mr. W. W. Townsend, of Colchester, was apprenticed to the Yarmouth Gas Company in 1868. The Town Clerk (Mr. W. T. Stephens, O.B.E.), in reply, said Yarmouth was proud of its antiquity and of its modernity. The Domesday Book recorded that Yarmouth was a borough with 70 burgesses, and its first charter, granted by King John, was still in wonderful preservation. Yarmouth was proud of the ships and sailors it contributed to rout the Spanish Armada, and with the exception of London and Bristol no other port furnished so many. The Corporation had endeavoured to make Yarmouth one of the most up-to-date health and pleasure resorts in the country.

The toast of "The Association" was in the hands of the Mayor (Alderman A. H. Beevor), who expressed the view that there never need be any unfriendly rivalry between electricity and gas. However successful electricity undertakings might be as time goes on, he felt convinced that the demands for gas would continue to increase.

Happy Relations—Engineers on the Board.

Mr. Walmsley, returning thanks on behalf of the Association, remarked that circumstances to-day made it impossible for a man to remain in splendid isolation, without knowing what his friends were doing. Their Association was a very happy one indeed. Both national and local organizations were essential to the Industry. Referring to the prominent members of the Eastern Counties Association, he said that Mr. Prentice, who had had fifty years' service at Ipswich, started there as a boy, and the Directors, when he retired a short time ago, elected him to the Board. It was becoming increasingly the case that Engineers who had proved their ability were elected to seats on the Boards of their undertakings; and it was an occurrence that should be even more frequent. Men who had the actual running of a business should, after furnishing satisfactory proof of their qualifications, be given a voice in the management as a member of the Board. ["Hear, hear."] They had with them Mr. J. H. Troughton, of Newmarket, who was a shining example of the kind of man he had in mind. He was Chairman, Managing Director, Engineer, and Secretary of his Company.

"Our Visitors and Press" was submitted by Mr. Thomas Glover, M.Inst.C.E., Norwich, who paid a tribute to the Press for their alertness, enterprise, and constant interest; for their prompting of engineers when they might be a little slow; and for all that they did for the Industry year in and year out. "I refer," added Mr. Glover, "to the 'JOURNAL' and the other technical papers." The Gas Industry, proceeded Mr. Glover, asked only for fair play to carry out its work to the satisfaction of the community. As an old Industry, they had inherited restrictive laws which sometimes placed them at a great disadvantage. He hoped they would soon secure a more flexible method of charging.

The Borough Electrical Engineer (Mr. Percy E. Rycroft), who replied, declared that, as a newcomer to the Eastern Counties, he had been the recipient of many kindnesses, and it was a source of great pride to him that, within a day or two of his arrival, he was able to number Mr. Walmsley, their President, and Mr. Keable, of Gorleston, among his friends. In spite of rivalry, there was a common banner under which both Industries could serve—the banner of "Service to the Public." Each doing what it could for the advancement of mankind. Further, he was not without hope that, in the not very distant future, there might be established between the two professions a closer technical contact. [Applause.]

BUSINESS MEETING.

When the members assembled at Goode's Hotel, on the Marine Parade, for the business meeting in the afternoon, feeling reference was made by the PRESIDENT to the great loss that the Association and the Industry had sustained by the death of Sir Arthur Duckham—a man of outstanding personality and extraordinary gifts, and one whom they could ill-afford to lose. It was extremely sad that he should have been cut off in the prime of his powers. Another death was that of Mr. G. Baines, of Harwich, who joined as an Associate Member in 1906, and resigned in 1928. Mr. Gregory, of Harwich, was not present, as he was attending the funeral of Mr. Baines.

As an expression of sympathy, the members stood in silence.

The PRESIDENT (continuing) said that, as they were aware, their friend, Mr. W. M. Mason, the late Manager of the British Commercial Gas Association, was very sorely afflicted, and in consequence he had had to resign his position. Everybody present knew him, and all were familiar with his great kind-heartedness. He was sure Mr. Mason would appreciate a letter from the Association recording their sympathy with him in his illness, and expressing earnest good wishes for his speedy recovery to health. He moved that such a letter be sent.

Mr. J. W. AUCHTERLONIE (Cambridge) seconded this, and it was agreed to.

The HON. SECRETARY AND TREASURER (Mr. W. C. Chapman, of Boston) having announced the receipt of a number of letters of apology for absence,

The PRESIDENT presented the Past-President's Medal to Mr. J. Green, of Wisbech. They had all, he said, very vivid recollections of the great care Mr. Green took in looking after them during their enjoyable visit to Wisbech twelve months ago. It was one of the most successful meetings the Association had had, and it impressed Mr. Green upon them as a man of outstanding ability.

Mr. GREEN, in acknowledgment, said he would like to pass on these appreciative remarks to his staff, who had done so much to assist him on the occasion of the Association's visit. The medal would always remind him of an exceedingly happy period as their President.

Membership Roll.

It was announced that three resignations had been accepted by the Committee on behalf of the members: T. Worthington (Halesworth), H. G. Gazley (late Woodall Spa), and F. Pinder (Hatfield).

The following new members were elected:

Ordinary.—C. E. Grimwood (Sudbury), E. J. Fillery (Newark), C. E. Byrt (Gainsborough), A. W. Sumner (Ipswich), and J. J. Wells (Great Yarmouth).

Honorary.—W. H. Mainwaring, late Engineer to the Lincoln Gas Department, a member of the Association since 1889, and for six years acting as Hon. Secretary and Treasurer of the Association; and J. Wilkinson, late Engineer to the Nottingham Corporation Gas Department, and Past-President of the Institution of Gas Engineers, a member of the Association since 1913—for his services to the Association and the Industry generally.

On the proposition of Mr. J. H. TROUGHTON (Newmarket), the annual report and balance-sheet were adopted. He said the accounts made an excellent showing; they were paying their way, and this was all they needed to do.

It was explained that there was a balance in hand of £44 5s. 3d. There was also in the President's Benevolent Fund (founded by Mr. W. Jones) a balance of £81 2s. 6d.—a donation of £5 5s. having been made during the past year.

Mr. F. A. WEST (Newark) seconded, with the remark that the accounts reflected great credit upon all connected with the Association.

It was agreed that £5 5s. be given to the Benevolent Fund of the Institution of Gas Engineers out of the Association's own funds.

Mr. TROUGHTON said it was very regrettable that the Institution Benevolent Fund was not more generously supported. He urged each member individually to subscribe.

Presidential Address.

The next item on the agenda was the address of the President, which was published in last week's "JOURNAL"—see pp. 266-270.

At its conclusion, Mr. FRANK PRENTICE (Ipswich) proposed a hearty vote of thanks to the President. It was, he said, a model address in many respects. He personally had been very interested in the reference to the dry gas plant. The day was not far distant, he thought, when this would be the common practice on all works. It did away with many difficulties. They had that morning seen highly efficient meter repair shops, and the methods adopted for dealing with cookers, and these should serve as incentives to the members generally. The figures relating to fish frying were remarkable. A wonderful example had been set by Mr. Walmsley in the finding of a new outlet for his commodity. The selling of gas should always be kept to the forefront of their programme. He was glad the President mentioned the National Institutions, which did so much in a quiet way. He had in mind particularly the National Gas Council and the Federation of Gas Employers. These two bodies were doing most important work. There was no one in that room who had not benefited by the activities of these organizations. ["Hear, hear."]

Mr. W. W. TOWNSEND (Colchester), who seconded, remarked that the President had given them a very wide survey. They ought to spend more time than they did in discussing sales questions.

The vote was carried with applause, and briefly acknowledged by the PRESIDENT.

The following paper was then read and discussed.

GAS METERS AND THEIR RELATION TO UNACCOUNTED-FOR.

By A. T. GILBERT.

In the first place, gentlemen, I must say how much I appreciate the honour extended to me by this opportunity of addressing you at your annual meeting.

The subject of my address is of paramount importance to all gas undertakings, though it is hardly admitted by some, and only partly by others; however, there are many who fully realize the seriousness of the losses sustained, and they organize means to counteract them. We find in the Gas Industry a few Executives who argue that it costs more to trace the leakage, and where it concerns meters to replace the meters than does the leakage, but I submit that the subject can hardly be dismissed in quite such a casual manner.

In all trading concerns there should be a balance of accounts, and, with the exception of the Gas Industry (and perhaps some protected industries) unaccounted-for losses would not be tolerated for very long; yet in your Industry such figures as 5, 10, 15, 20, and more p.ct. are not only tolerated, but expected. Mere corrections for temperature, barometric pressure, &c., do not dissipate more than 1 p.ct. of the leakage, and yet roughly it means that 5-20 p.ct. more coal is bought, stored, handled, and carbonized than need be.

These points, I believe, are fully realized; but in many instances it is thought that it is cheaper to cut the loss than to probe too deeply and have to renew meters and plant.

A SURVEY OF DISTRICT CONDITIONS.

First we have a station meter, or meters, as the case may be, the unit of supply working under almost ideal and constant conditions of load, temperature, and pressure; radiating from this unit are hundreds or thousands of smaller units, each one working under different conditions of temperature, pressure, and load, and the first and last named are of infinite importance.

In many cases there is not sufficient attention paid to the position in which a meter is fixed, for there may be as much as 30° difference in temperature between a cellar position and that of a living room. Many meters are acting as condensers when fixed in cellars, for they offer a considerable surface area to cooling influences and the tinplate casing is a good conductor.

Pressure differences, too, have quite a considerable influence upon the accuracy of a dry meter, more than is generally conceded, for here the flexible membrane may exert its baneful influence.

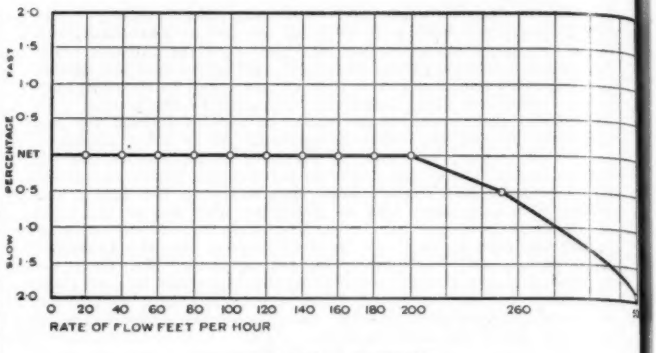
But the condition which plays greatest havoc with your meters is the fluctuating load. At one time a meter may have a load well above its capacity and at another (say, during the night) it may be just measuring a by-pass or even a leakage of 0·2 c.ft. per hour, in the one case working at 200 to 400 revs. per hour, and in the other probably 1 rev. in 2 hours, when suddenly the cock on a geyser is opened and the meter races off at 150 c.ft., 600 revolutions per hour for 20 minutes or so, and then another lighter or even an additional load may be applied. And so each consumer and meter must be a different problem.

THE INTERMITTENT LOAD.

The intermittent load on consumers' meters has always been a very complex question, but to-day, with multifarious facilities for gas use, meters are required having a flexible output combined with equable registration. I know it is a difficult question, especially when it means considerable outlay, but there is still a tendency among gas district officials, when deciding upon the meter for a certain installation, to have a subconscious thought that "all the appliances will not be in use at once," and a meter is installed, therefore, which is hardly adequate even for the smallest household appliance.

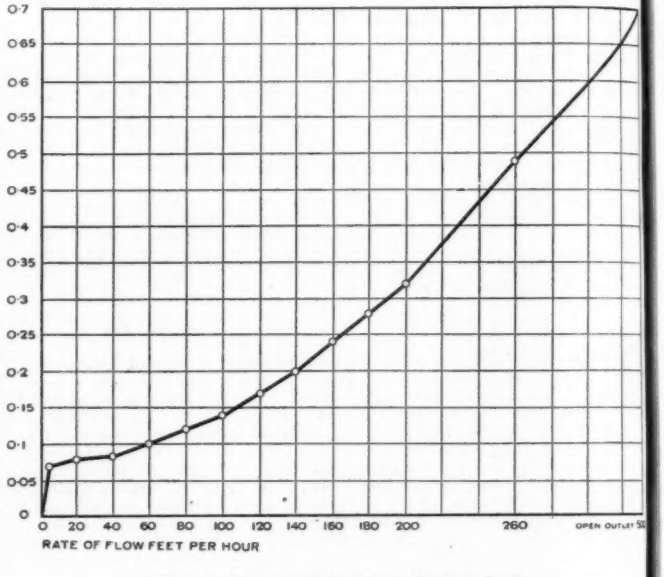
Hence, gentlemen, your basis of judgment when installing meters should be discovered by actual test installations under your own particular conditions. In days gone by Thos. Newbigging and others compiled tables specifying the sizes of supply piping necessary for all and sundry in the Gas Industry, simply because there was a standard practice in gas manufacture. But the present-day freedom under the 1920 Gas Regulation Act allows such varying conditions in gas values that standard practice in meters or appliances has been raised to a fine art.

Therefore, with new installations, the "flexible output meters" will meet the case if kept within reasonable limits of pressure loss across the meter.



Graph of Test Results

Obtained from a 100-ft. per hour Ordinary Meter taken from Stock. Capacity per Revolution, 0·2 c.ft. Fitted with 5 Light Unions.



Graph of Pressure Absorption at Various Loads.

(Meter as above.)

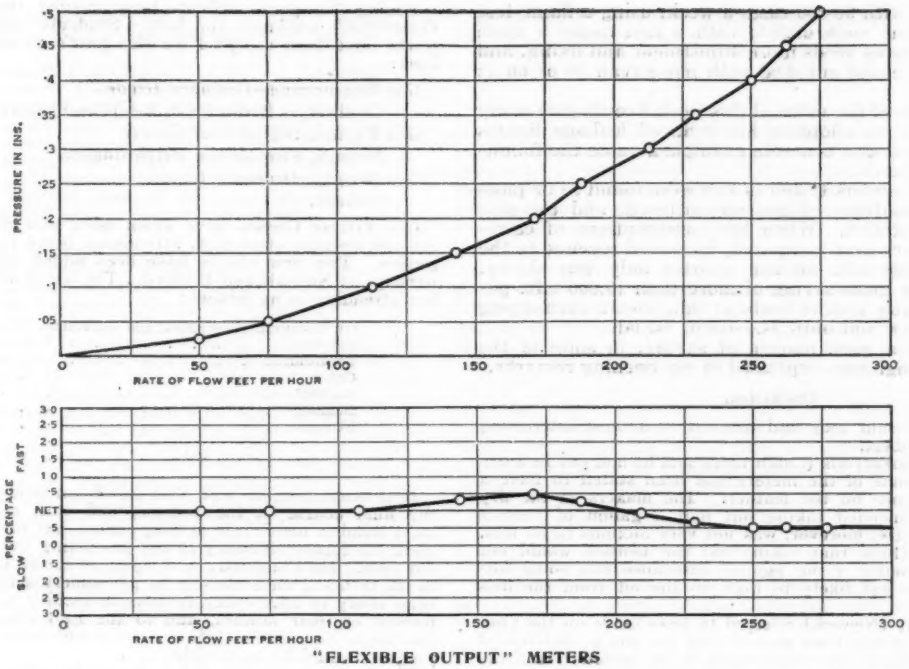
OLD METERS.

The real problem is how to deal with the old type meters which crowd your districts—meters, already too small for the original load, which may have been added to without your knowledge. It is in these instances where loss by slow registration can be traced. Recently I had tests made on 50 meters which had been taken off various districts and made by 8 different makers. The sizes were 3-light and 5-light and No. 1 and No. 2. These were all tested first at badged capacity, and then, in the case of the 3-light and No. 1, at 100 c.ft. per hour, and the No. 2 and 5-light at 120 c.ft. per hour. The range of increased slow error was between, in the first instance, 1·91 to 18·32 p.ct., and in the latter between 1·42 to 15·83 p.ct. Yet in many instances these meters were correct at normal hourly rate of 18, 30, or 40 c.ft. per hour.

With a very slight effort, therefore, it can be seen what a great influence the overload factor may have upon the efficiency of your multiple measuring system. Small items have a peculiar way of showing huge totals, and when one considers that (all other conditions being equal—and as a rough computation only) 100 meters registering 1 p.ct. slow means the loss of the consumption of one consumer, then the effect which this aspect alone has upon the leakage account should not be lost sight of.

METERS PASSING FREE GAS.

The dry meter, be it ever so well designed and constructed, has always the flexible diaphragms which, being of an animal substance, are ever liable to variation according to temperature of position in which fixed, pressure at which it is worked, and the fluctuation of gas flow according to demand. These membranes, after years of saturation in gas (which must have a deleterious effect upon them, more pronounced with some gases than others), and also oscillating to and fro thousands of times, are bound sooner or later to break under the strain and allow gas to pass freely through the meter. Unfortunately this state of TOTAL



"FLEXIBLE OUTPUT" METERS

Passing gas at varying rates of flow from 5 to 700 c.ft. per hour, with pressures fluctuating from 3 in. to 54 in., have been running for many months.

collapse does not always occur, and the process of perforation may be a very slow one commencing with a very small pinhole which gradually increases in size allowing more and more gas to pass through the meter without doing the work of driving the meter. Whatever size the fissure in the diaphragm may be, it can only pass gas according to the pressure behind the orifice, and this, in the majority of cases, would be full district pressure. It may therefore be possible for this small fissure to pass sufficient gas to supply a small leak on a cooker tap-rail, a by-pass, lighting burner, or ring, and the consumer doesn't let you know how long these small units may be in use. But it may be for considerable periods, such as leakages 24 hours per day, by-passes 24 hours, lighting burners several hours, and simmering burners several hours per day. Then there are many other low consumption appliances such as gas irons, and even low combustion water heaters burning continuously.

Tracing the Leakage in Early Stages.

It must be readily appreciated, then, that the sooner the defect is discovered the better. One must not wait until that final failure to register, which may happen to be after years of the embryo stage. May I advise you, then, to watch always the small consumption, for it can be taken as a rough rule that if very small consumptions are registered, then at full badged capacity the meter may be accepted as doing its work satisfactorily. Every member of your fitting and inspecting staff should be urged to watch all meters when a small burner is on, and a check should be made to see that the meter works through one revolution of its mechanism. Whatever the revolution capacity may be, whether 0·125, 0·25, or more, see that that amount at least is completed on the testing dial before the test is abandoned.

Meters brought in from district should have a similar test applied which can be carried out by coupling together in series.

If a system of *in-situ* test can be instituted there are several kinds of portable apparatus available, including graded burners and the excellent test meters, complete with pressure gauges and connections. I do not advocate a systematic house-to-house visitation in the first place, because I know from past experience that the results would not be encouraging, and it is not likely that new meters, or those recently reconditioned, should need to be tested, and no meter should need your attention during its period of guarantee.

In-Situ Testing.

The better course, therefore, is to build up a sensitive staff always watching old meters' records; and the slightest decline in quarterly or monthly figures should be followed up by the *in-situ* flame test. This method has many advantages; the questionnaire is done away with (and it always causes irritation to consumers), and if the test reveals gas passing free the meter is replaced. If, on the other hand, the meter is doing its work, it may be good (if not disturbed) for several years' more service. In this way you are bound to be usefully served by the *in-situ* test, for you either find out a bad meter or you have *proved* it to be a good one.

A careful watch should be kept on recorded meter readings, and your inspectors or rental department should be trained to discern where a decline in corresponding consumptions occurs, however gradual this may be.

I give the following as a fair example of such declining records:

Date of Reading.	State of Index. Carr. F/w.	Quarter Ending.				Remarks.
		Xmas. Carr. F/w.	L'Day.	Mid'sr.	Mich'.	
	948·2	40·200	36·100	19 600	32·500	
	987·3	39·100				
	023·1		35·800			
	043·2			20·100		
	073·5				30·300	*
	111·7	38·200				
	146·7		35·000			
	167·9			21·200		
	197·4				29·500	
	235·0	37·600				
	268·8		33·800			*
	288·3			19·500		
	315·9				27·600	Watch! Tested *in-situ* 9 ft. per hour unregistered gas
	151·1	35·200				

* In my judgment the test should have been made two years previously at *.

Many undertakings have an old system of book examination and questionnaire which is followed up by "meter exchange and bring home for test" instructions. Where such a system exists it may be well to consider the number of meters which are found to be correct and, if tested *in situ*, would certainly not have been brought in, thus saving exchanging costs and replacement charges, which may be in the region of 5s. per meter.

The costs per meter of the *in-situ* flame test must depend to a great extent upon local conditions and the amount of walking time, but to put it into round figures a man should

be able to deal with 90-100 cases a week, using a flame test and disconnecting each outlet; with a test meter a more elaborate apparatus needs more adjustment and fixing, and then your man could not deal with more than 50 or 60 at most per week.

As an estimate of the value of this work I could give many instances where its adoption has reduced leakage figures considerably; and as a concrete example I quote the following from my records:

Seventy-eight meters tested *in situ* were found to be passing varying quantities of gas unregistered, and the new meters were installed. When the consumptions of corresponding quarters were compared, increased revenue to the extent of 840,000 c.ft. on one quarter only was shown. This would be a gross saving of more than 10,000 c.ft. per meter; and taking testing costs at 9d., meter exchanging and cartage (new and old), 5s.—total, 5s. 9d.

There is still a good margin of saving, in spite of the views of some engineers expressed in my opening remarks.

Discussion.

The PRESIDENT said they had listened to a most interesting paper by Mr. Gilbert.

Mr. J. W. AUCHTERLONIE (Cambridge) said he had put in a dry gas plant, and some of the meters had been stated to have a hardening substance on the leather. The makers of the dry gas plant recommended taking out half a gallon of benzole per ton of coal. He, however, was not very anxious to do this. Did the author think that taking out the benzole would not aggravate the trouble if the gummy substance was going forward. Was dry gas likely to take up the oil from the diaphragms?

Mr. F. A. WEST (Newark) referred to tests made on the Continent by which it had been proved that the gas as distributed actually added oils to the diaphragms of the meters. Had the author any experience of meters used at any works where benzole was extracted? The question of benzole extraction was becoming quite prominent, and this point was important. Distributing low-grade gas he had found not altogether satisfactory for dry meters.

Mr. THOMAS GLOVER (Norwich) said that, as one who practised benzole extraction thoroughly during the war, he had never found that the diaphragms suffered from dryness over that long period. It seemed to him that there was a sort of balance set up. The oils put into the leathers when they were first made into diaphragms extracted oils from the gas, if the gas was made in a reasonable manner. That was, if too much air and other gases were not drawn in by the exhauster, the natural oils in the gas acted as lubricants, and the diaphragms extracted oils until a balance was reached. He did not think that, with normal gas made with a fair amount of condensable hydrocarbon, there need be any fear. The unaccounted-for gas at Norwich was under 5 p.ct. during benzole extraction and afterwards. The ideal condition of meters was for diaphragms to remain quite flexible owing to the oil from the gas, and he believed this condition would continue even with benzole extraction. The lecture to which they had listened was just the right sort of thing for the Association.

Mr. GILBERT, in reply, said he did not profess to be a chemist, but he had found upon close research into the subject that this meter question was so greatly affected by varying local conditions that it was hard to dogmatize on any particular point. It was the old meters they might look to for their improved meter practice. Every gas undertaking should have some place where they could open meters and examine them, and by making use of the chemical experts they had at disposal, they should be in a position to compare notes of experience with the meter makers. In his experience meters had been removed from a district where they had been fixed within a hundred yards of each other, passing the same gas, over similar periods, and yet they had each developed troubles of an entirely different character. The whole question of meter performance under the varying conditions of position and temperature introduced such complex considerations that it was difficult to dogmatize on the subject. With regard to oil used in the dressing of diaphragms, although almond oil was still widely used, it had a tendency to drain to the bottom of the diaphragms, and therefore heavier oils were now being used, and it is found that the top portion of the diaphragms retained the oil for a longer period. Speaking for his own associated companies, oils having the lowest acid content were always used, and that was the most important factor.

Mr. C. R. ARMITAGE (Norwich), proposing a hearty vote of thanks to the author of the paper, said he had great admiration for Clegg. He did not think there was another piece of scientific apparatus to-day that had gone through so many years without any alteration in fundamental principles.

Mr. B. CLARKE (Stamford) seconded, remarking that it was a compliment to the Association that experts outside their own ranks should come along and give them the benefit of their experiences.

Education Scheme Report.

Mr. E. F. KEABLE (Hon. Secretary of the Committee) read the following annual report:

The Education Committee present to the members of the Eastern Counties Gas Managers' Association their Annual Report.

During the year students have availed themselves of the Committee's guidance and help. Students from the following towns have been accepted for this year's examinations as follows:

Gas Engineering—Ordinary Grade.
Cambridge, Bedford (2), Leighton-Buzzard.
Gas Engineering—Higher Grade.
Newark, Cleethorpes, Brightlingsea.
Gas Supply—Ordinary Grade.
Newark.

Gas Fitting Classes have again been well attended, in one case an average of 90 p.ct. attendance being registered for the session. Two new classes have been added during the year—namely, at Newark and Bedford. The list of centres and number attending is as follows:

Gt. Yarmouth, Lowestoft, and Gorleston	12
Ipswich	14
Cambridge	15
Colchester	16
Norwich	13
Bedford	24
Newark	12
Total	106

It is interesting to note that in all ten students were taking the final course in the Scheme, and this, coupled with the total number under instruction, cannot but make its mark felt upon the future efficiency of the gas fitting work carried out in our area. The Committee wish again to record its sincere thanks to the tutors of these classes, the gas undertakings who have ever been ready to offer every reasonable facility to students in the pursuit of their studies, and to the Education Authorities in the towns named for their valued co-operation, without which progress would be impossible.

The Committee respectfully suggest that the higher standard being reached by the students should, wherever possible, be suitably recognized. The Industry in its fight for expansion, in competition with State-aided electricity, will need all the intelligent craftsmanship that it can command, and it is hoped that the list of centres will continue to grow.

This year the Ipswich Gas Light Company are sending their tutor of the Gas Fitting Class to London for the short course for teachers, arranged by the Board of Education, and it is to be hoped that next year, if such facilities are extended, more will take advantage of same.

The Secretary, as District Representative, has attended every meeting of the Gas Education Committee held in London during the year.

The Committee were recently asked to undertake the working of the British Commercial Gas Association's Scheme for the education and training of gas salesmen, and this additional work they readily undertook; and, so far, final examinations have been arranged and conducted in the following centres—namely, Grimsby, Ipswich, and Great Yarmouth, students being examined at these centres were: Cleethorpes 1, Colchester 4, Gorleston 1, Grimsby 1, Ipswich 5, Lowestoft 3, Sheringham 1.

The Committee strongly recommend every possible salesman to take advantage of the excellent course arranged, therby fitting themselves for the greatest possible service in the future, and as in the Education Scheme, they will be ready to render every possible service to students.

Signed on behalf of the Committee.
A. GREGORY, *Chairman.*
E. F. KEABLE, *Hon. Secretary.*

Mr. W. W. TOWNSEND (Colchester) said the Gas Salesmanship Course had not been adopted as widely as it should have been, and this was perhaps because there was a little misunderstanding as to its real object. There was a general idea that the salesman was a showroom superintendent, and very likely distribution superintendent, and that any idea of giving such a person further information was like gilding the lily. But they all recognized that there was more competition to face than ever before, and that they needed more salesmen, and the difficulty was to find men capable of undertaking the work. Therefore this Course would help them a great deal. He did not think a man untrained in the Industry was any good for canvassing. Get bright young men from technical schools, train them as fitters, and then put them out as canvassers, and the result would be very successful. From personal experience, he recommended the B.C.G.A. Course as assisting in this very desirable object.

The adoption of the report was moved by Mr. W. GROGONO (Croydon), seconded by Mr. T. V. JOHNS (Lowestoft), and carried unanimously.

It having been decided that the Autumn Meeting should take place in London on a date to be decided upon, the members took tea together, and very shortly afterwards sat down in the same hotel, for their annual dinner, with the President in the chair.

Dinner Speeches.

The toasts followed the luncheon programme, but on this occasion "The Town and Trade of Great Yarmouth" was submitted by Mr. R. G. SHADBOLT, of Birmingham, who pointed out that the area covered by the Eastern Counties Association was

rich in towns having long and proud histories, and of this fact Yarmouth provided an outstanding example. The MAYOR replied.

"The Great Yarmouth Gas Company" was in the hands of Mr. J. W. AUCHTERLONIE (Cambridge), who said the members would like him to convey to the Chairman and Directors of the Company their sincere thanks for the cordial manner in which they had been received and entertained. They had enjoyed themselves in every way. The Board, with the assistance of their able Engineer, had thoroughly consolidated the position of the Company since the bad times of the war. In such circumstances, he felt sure the Company would continue to make progress.

Mr. A. P. RISING (Deputy-Chairman of the Company), in reply, said they were very glad to welcome the Association to Yarmouth. Their pleasure was increased in view of the fact that the President was the Company's Managing Director. They had the utmost confidence in him. Under his skilled guidance the Company had continued to progress, as their visitors had seen when they inspected the works, notwithstanding the bad times Yarmouth had passed through owing to the poor fishing and very wet summer. The President said at the preceding meeting that those who managed gas companies and proved themselves should be given a seat on the Board. In that view he (the speaker) entirely concurred, and in furtherance of that Mr. Walmsley had been appointed a Director and was a valued member of the Board of the Yarmouth Company. They were a very happy family, all working for the common good—Directors, Secretary, officials, and, not least, the employees, to whose efficiency and good work they owed so much.

The remaining toasts were "Our Visitors and Press," proposed by Mr. W. W. TOWNSEND (Colchester), and responded to by Mr. ALFRED HARRISON (the Editor of the "JOURNAL"); and "The President," which was drunk with musical honours, at the call of Mr. FRANK PRENTICE.

An excellent musical programme contributed to an evening which was thoroughly enjoyed by all.

AT THE WATER-WORKS.

The morning of Thursday had been set apart for a visit to the works of the Great Yarmouth Water-Works Company. The Chairman, Directors, and officials had made complete arrangements for the comfort of their guests. But, alas, the day opened with the weather in stern, unbending mood, and when at length it did relent, some of those who would otherwise have been present had decided not to go. They missed a treat.

The first objective was a re-inforced concrete water tower, which is in course of construction at Caister, by the Trussed Concrete Steel Company, Ltd. The party were met by Alderman Greenacre (Deputy-Chairman of the Water-Works Company) and Mr. W. Sprott (the Engineer), who, together with representatives of the contracting firm, explained the various details. It so happened that the construction was at just the stage at which the design could be fully inspected, and the visit proved highly profitable. When completed, the height from the ground to the extreme top of the dome roof will be 161 ft. 9 in., and the total capacity will be 784,000 gallons.

Afterwards the party proceeded to the beautifully situated works of the Company at Great Ormesby, where light refreshments were served, and the visitors took leave of their President and hosts.

Some members also availed themselves of the opportunity of visiting the works of the Gorleston and Southtown Gas Company.

LEIGHTON BUZZARD GAS COMPANY.

Sale of £3000 Stock.

The sound position of the Leighton Buzzard Gas Company was revealed by the sale by auction on April 26 of £3000 of consolidated ordinary stock. Mr. H. W. Clough conducted the sale in the Corn Exchange, Leighton Buzzard, and the sixty lots of £50 of stock found a ready sale. Prices varied slightly, but the average of the lots was practically par.

The authorized capital of the Company is £59,861, of which £48,998 has been issued and £10,863 remains to be issued. The authorized loan capital of the Company is £29,814, of which £16,500 has been issued.

The present issue of stock was made for the purpose of paying off a loan of £3041 with Barclays Bank, Ltd., on the cost of the new gasholder which was erected in 1926. The stock is nominally 5 p.ct., but since 1928 dividends of 6 p.ct. have been paid. On Dec. 31 last the balance on the revenue account was £4026, and on the reserve and special purposes fund £4917.

Mr. Clough told the large company attending the sale that the Gas Company was established in 1835 and for 97 years had, without interruption, supplied gas, coke, &c., to the town and the district. During the past ten years the quantity of gas sold had increased by 8½ p.ct. The consumers in 1921 numbered 2724 and in 1931 3375—an increase of 651.

The advent of electricity has made no difference in the valuation placed upon Leighton Buzzard Gas Stock by the investing public. The price at auction for the last ten years has varied between £96 and £100, except one lot of £100 only, which fetched £104 in 1928.

The figures for recent sales were:

1922	£96
1924	£95
1927	£97
1932	£100

The recent slump in speculative stocks has caused the prices of steady investments to advance, and the Gas Company is now paying 6 p.ct., but, as will be observed from the figures, the Leighton Gas Company's stock seems to command its price independent of general financial considerations.

Parliamentary Intelligence

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Kettering Gas Bill has been read a first time and referred to the Examiners.

The Scarborough Gas Bill has been read a second time and committed.

The opposition to the Gas Light and Coke Company Bill has been withdrawn, and the Bill has been committed.

Special Order.

The Willenhall Gas Order has been passed by the Special Orders Committee and is awaiting the Affirmative Resolution of the House.

House of Commons.

Private Bills.

The Kettering Gas Bill has now been read a third time and sent to the Lords.

The Oakham Gas and Electricity Bill has been reported, with amendments, from the Committee.

Special Order.

The Willenhall Gas Order has been put down for approval.

New Capital Issues.

Chichester Gas Company.—The tenders sent in for the £7500 5 p.ct. perpetual debenture stock, which was offered on behalf of the Directors of this Company, were opened on May 5. A total of £16,550 stock was applied for at prices ranging from £101 down to the minimum of £96 per £100, the lowest accepted tender being at £99 12s. 6d. per £100. The average price obtained was £99 14s. 7d. p.ct.

Bognor Gas and Electricity Company.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale by tender, on behalf of the Directors of this Company, £25,000 of 5½ p.ct. redeemable debenture stock at a minimum price of issue of £102 10s. per £100, yielding at that price (allowing for redemption at par on Dec. 31, 1950) £5 5s. 4d. p.ct. Tenders must be received by 11 a.m. on Tuesday, May 24.

Swansea Gas Light Company.—The issue of £350,000 of 5½ p.ct. redeemable preference stock offered at par by this Company was heavily over-subscribed, the amount of capital applied for being no less than £2,412,000. The list opened on Tuesday, April 26, at 10 a.m., and closed for London applications fifty minutes later, letters of allotment being dispatched on April 30. Dealings in this stock on the re-opening of the Stock Exchange on May 3 commenced at from 1¼ p.ct. to 2¼ p.ct. premium.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

On the opening of the new Account after the May-day holiday, the tone on the Stock Exchange was slightly more cheerful. The liquidation which set in during the previous week had died down and prices in some sections, including several of the leading industrials, began to recover. Judging from the results of recent new issues, it is clear that ample funds are available for investment when the present nervousness with regard to the general outlook has been allayed, and the fact that a few of the issues oversubscribed last week were of a more speculative nature is an indication that some investors at any rate have confidence in the future of the industrial market.

The Gas section was again firm, and during the four days of business quite an appreciable number of transactions were recorded. Prices were well maintained, and in several instances at levels to justify some further appreciation in the market value. Outstanding features were gains of 7 points each in Shrewsbury ordinary to 97½ and Tottenham 5½ p.ct. preference to 102½, while the Mid-Southern District 4 p.ct. preference rose 5 points to 77½. The latter Company, it will be remembered, is issuing a further £100,000 of this stock at a minimum price of £75 p.ct.

Following on the comparative table of ordinary stocks published in this Report last week, it will be seen from the list given below that preference stocks also have in most cases considerably improved in value over the past two years. Wandsworth 5 p.ct. shows the greatest gain over 1930 by no less than 12 points, South Metropolitan 6 p.ct. coming next with 8 points.

Preference Stocks.

—	May 9, 1930.	May 8, 1931.	May 6, 1932.
Bournemouth 6 p.ct. (£10)	11	11⅝	11½
British 7 p.ct.	117½	112½	117½
Gas Light 4 p.ct.	78½	79½	83
Mid-Southern 4 p.ct.	71½	77½	77½
Newcastle 4 p.ct.	70½	74½	75½
South Metropolitan 6 p.ct.	108¼	113½	116½
Tottenham 5½ p.ct.	96½	102½	102½
Uxbridge 5 p.ct.	87½	90½	92½
Wandsworth 5 p.ct.	87½	97½	99½

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *May 9.*

The value of tar products are to-day as follows:

Pitch is firm at 95s. per ton f.o.b.

Creosote for export varies from 3⅞d. to 5d. per gallon f.o.b., according to specification.

Refined tar is 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 7d. per gallon at makers' works; pure benzole, 1s. 8d. per gallon; 95/160 solvent naphtha, about 1s. 5d. per gallon; and pyridine bases, 3s. 9d. to 4s. per gallon.

Tar and Tar Products in the Provinces.

May 9.

The average prices of gas-works products during the week were: Gas-works tar, 35s. to 40s. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked North, 1s. 10d. to 1s. 10½d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 2¼d. to 1s. 3d. Heavy naphtha, North, 11d. to 11½d. Creosote, *ex* works, in bulk, North, liquid and salty, 3d. to 3½d.; low gravity, 1¼d.; Scotland, 3d. to 3½d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid, 60's, 1s. 8d. to 1s. 9d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *May 7.*

Trading continues on a fair scale with quotations for most products firm in tone.

Crude gas-works tar.—Actual value is firmer at 55s. to 60s. per ton *ex* works.

Pitch.—Export value is nominal at 82s. 6d. to 87s. 6d. per ton f.o.b. Glasgow, while 85s. to 90s. per ton in bulk *ex* works is obtainable for odd wagon loads for home consumption.

Refined tar to Ministry of Transport Specification is very firm and quotations are not lower than 4½d. to 4¾d. per gallon f.o.r. in buyers' packages.

Creosote oil.—Production is low and quotations are steady. B.E.S.A. Specification is 3½d. to 3¾d. per gallon; low gravity, 3⅞d. to 4d. per gallon; and neutral oil, 3¾d. to 4d. per gallon; all *ex* works in bulk.

Cresylic acid.—No material alteration can be recorded. Pale, 97/99 p.ct., is 1s. 1d. to 1s. 2d. per gallon; dark, 97/99 p.ct., 1s. to 1s. 1d. per gallon; and pale, 99/100 p.ct., 1s. 3d. to 1s. 4d. per gallon; all *ex* works naked.

Crude naphtha.—Available supplies are valued at 4½d. to 5d. per gallon according to quality and district.

Solvent naphtha.—Demand is slow and prices are easy. 90/160 grade is 1s. 2½d. to 1s. 3½d. per gallon, and 90/190 grade, 11d. to 1s. per gallon.

Motor benzole.—Price in bulk has been reduced to round 1s. 2d. to 1s. 3d. per gallon.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade, 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	7	to	0	7½	per gallon at works
Motor ,,	1	2	,,	1	3	,, ,, ,,
Pure ,,	1	6	,,	1	7	,, ,, ,,

Contracts Advertised To-Day.

Coal.

The Skipton Urban District Council invite tenders for gas coal. [Advert. on p. 340.]

The Padiham Urban District Council invite tenders for the supply of gas slack. [Advert. on p. 340.]

The East Dereham Urban District Council invite tenders for screened gas coal or nuts. [Advert. on p. 340.]

General Stores, &c.

The Gas Committee of the City of Leeds invite tenders for the supply of various stores. [Advert. on p. 340.]

Lighting Goods (Mantles, Lamps, Fittings, &c.).

The Gas Committee of the City of Leeds invite tenders for the supply of lighting goods. [Advert. on p. 340.]

Meters.

The Gas Committee of the City of Leeds invite tenders for the supply of meters. [Advert. on p. 340.]

Pipes.

The Conway Gas Department are inviting tenders for wrought iron tubes and fittings. [Advert. on p. 340.]

The Gas Committee of the City of Leeds invite tenders for the supply of wrought and cast iron pipes. [Advert. on p. 340.]

Retorts.

Tenders are invited by the Skipton Urban District Council for the renewal of retorts. [Advert. on p. 340.]

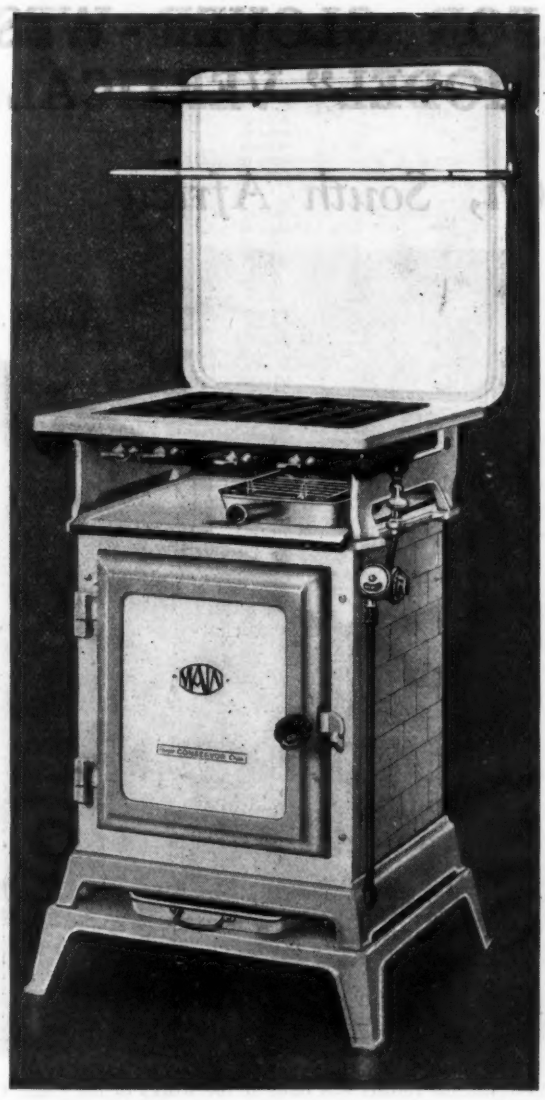
The Bakewell Urban District Council invite tenders for renewing and resetting retorts. [Advert. on p. 340.]

Trade Notes.

Cast-Iron Pipes and Specials.

The Stanton Ironworks Company, Ltd., near Nottingham, have taken over the London warehouse business in cast-iron pipes and specials of Messrs. Fellowes, Williamson, & Co., Ltd., Seagrave Road, London. They are arranging to carry in London a large stock of cast-iron pipes and specials, available for immediate delivery. The warehouse will continue to be situated in Seagrave Road, Fulham, on the site of the Brompton and Fulham L.M.S. Railway Goods Yard, and will continue under the management of Mr. Charles Williamson.

DELUXE MAINAMEL



Next to its carefully-Enamelled surfaces—outside and inside—the distinguishing features of this thoroughly dependable and efficient Gas Cooker are its patent CONSERVOR Oven with two burners for even heating, its reliable MAINSTAT Control with the Red dial, its STAINLESS Taps with Bakelite handles, and its Metallized Burners and Frets.

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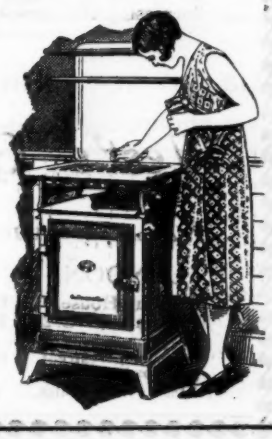
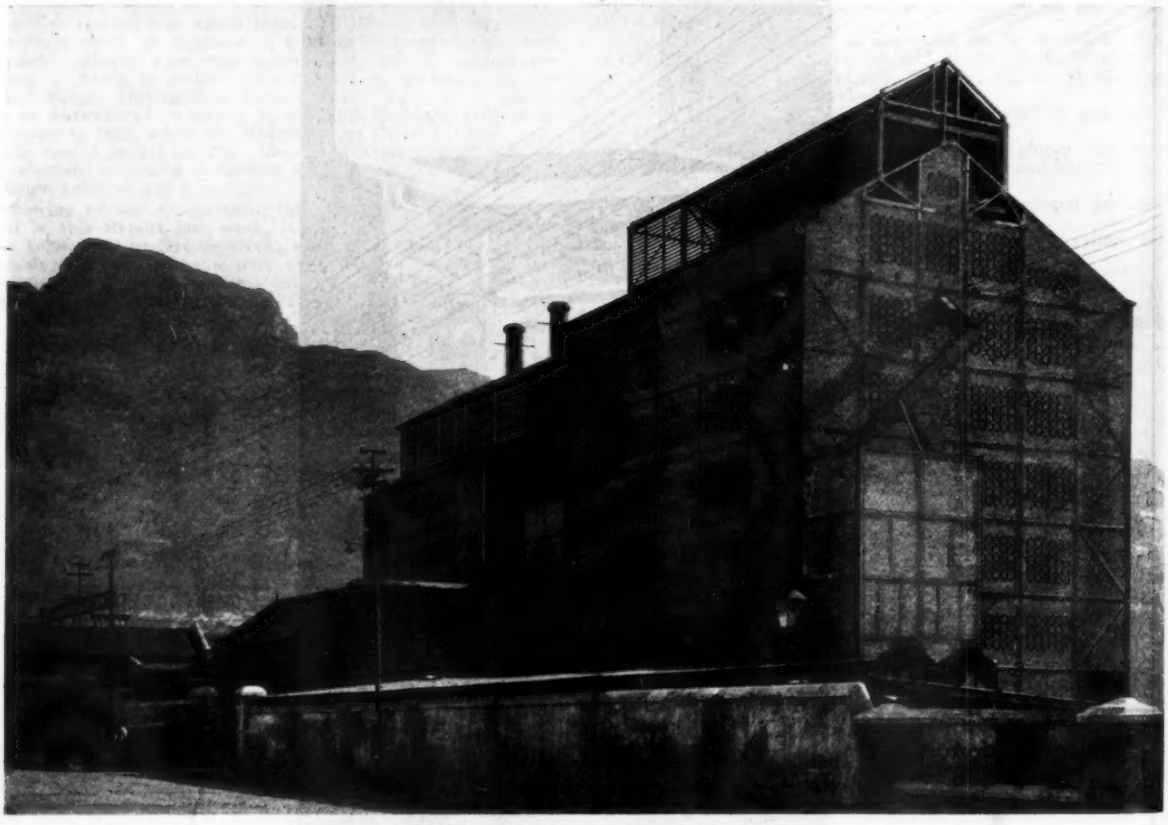


Repeat Orders

FOR GLOVER-WEST "NEW MODEL" VERTICAL RETORTS

Cape Town, South Africa



A plant of 16 Glover-West vertical retorts was built at the works of the Cape Town and District Gas Light and Coke Company in 1913, of 500,000 cu.ft. daily capacity. A repeat order followed in 1921 for a further 24 retorts of 750,000 cu.ft. daily capacity. Recently the No. 2 bench was converted to the New Model, increasing the capacity of this unit by 50%.

GLOVER-WEST VERTICAL RETORTS ARE DESIGNED, MANUFACTURED & ERECTED BY

West's Gas Improvement Company, Ltd.,

MILES PLATTING, MANCHESTER

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Regent House, Kingsway, W.C.2.
Tel. Address: "Imvertret, Westcent, London."
Telephone: Holborn 4108.

PARIS
Cie. Gle. de Construction de Fours, 8, Place des Etats-Unis, Montrouge (Seine).
Tel. Address: "Cormiques-Montrouge (Seine)."
Telephone: Vaugirard 27-95 & 27-96.

NEW YORK
West Gas Improvement Co. of America Incorporated.
441, Lexington Ave., New York.
Tel. Address: "Verticals, New York."
Telephone: Murray Hill 2-7242.

SYDNEY
Union House, 243, George Street, Sydney, N.S.W.
Tel. Address: "Vertical, Sydney."
Telephone: B 5865.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. May 6.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Apl. 4	7⅛	7⅛	Alliance & Dublin Ord. ...	100—105	...	102—103½
374,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
557,655	,,	Mar. 14	7	7	Barnet Ord. 7 p.c.	125—130	...	130
300,000	1	Apl. 29	1/4⅛	1/9⅜	Bombay, Ltd.	15/—20/-	...	17/-
177,750	10	Feb. 29	9	9	Bournemouth 5 p.c. ...	15—16	...	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12⅞—13½	...	13⅜—13⅝
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	11—12	...	...
50,000	Stk.	Dec. 14	3	3	Do. 3 p.c. Deb. ...	58—63	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	79—84	...	...
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	102—107	...	...
357,900	,,	Mar. 14	7½	7½	Brighton, Hove, & Worthing 6 p.c. Con. ...	121—126	...	125—127
540,000	,,	,,	6⅔	6⅔	Do. 5 p.c. Con. ...	108—113	...	...
195,500	,,	,,	6	6	Do. 6 p.c. B Pref.	113—118	...	117
1,287,500	,,	Feb. 29	5	5	Bristol 5 p.c. max. ...	97—99[a]	...	...
190,420	,,	Jan. 4	4	4	Do. 1st 4 p.c. Deb. ...	81—83[a]	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	81—83[a]	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	97—98[a]	...	...
885,000	,,	Apl. 4	7	8	British Ord.	112—117	...	114½—116
100,000	,,	Jan. 4	7	7	Do. 7 p.c. Pref.	115—120	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	75—80	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	98—103	...	102½
160,000	,,	Jan. 4	5	5	Cambridge 5 p.c. Deb. ...	95—100	...	...
100,000	10	Nov. 30	8	6	Cape Town, Ltd.	7½—8½	...	8
100,000	10	Apl. 29	4½	4½	Do. 4½ p.c. Pref. ...	6—7*	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	76—81	...	79—79½
626,860	,,	Feb. 15	6	6	Cardiff Con. Ord.	93—96	...	...
237,860	,,	Jan. 4	2⅝	5	Do. 5 p.c. Red. Deb.	95—100	...	...
157,150	,,	Feb. 15	5	6½	Chester 5 p.c. Ord.	87—92[b]	...	...
98,936	1	Oct. 5	1/2-	2/-	Colombo, Ltd. Ord.... ...	27/—32/-	...	...
24,500	1	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	17/—19/-	...	...
609,204	1	Apl. 4	-/10'90	-/11'47	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	...
296,053	1	,,	1/2'54	1/3'30	Do. 8 p.c. Pref.	10/—15/-	...	...
2,073,280	Stk.	Feb. 15	6	5¾	Commercial Ord.	96—99	...	97
475,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	61—64	...	...
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	115—120	+2	118—120
469,590	,,	,,	5	5	Do. max. div.	82—87	...	...
500,000	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	99—102	...	...
542,270	,,	Feb. 29	7	10	Derby Con.	117—122[c]	...	...
55,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	65—70[c]	...	...
209,000	,,	Mar. 14	5	5	East Hull Ord. 5 p.c. ...	75—80	...	...
179,500	,,	Feb. 29	5⅔	5⅔	East Surrey Ord. 5 p.c. ...	93—98	...	97½—97½
155,019	,,	Jan. 4	5	5	Do. 5 p.c. Deb. ...	97—102	...	...
1,003,180	,,	Mar. 14	14	16⅔	European, Ltd.	90—100	...	90—95
19,405,992	,,	Feb. 15	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	20/—21/-[f]	...	20/14—20/9
2,600,000	,,	,,	3⅓	3⅓	Do. 3½ p.c. max.	63—66	...	65—66
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	81—85	...	83—84½
6,102,497	,,	Dec. 14	3	3	Do. 3 p.c. Con. Deb. ...	64—67	...	65 - 67
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	103—106	...	105
2,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	96—99	+1	97½—99
162,280	,,	Feb. 29	10	10	Harrogate Cons. 10 p.c. max.	157—162	...	...
82,500	,,	Mar. 14	7	7	Hastings & St. L. 5 p.c. Conv.	97—102	...	...
258,740	,,	,,	5⅔	5⅔	Do. 3½ p.c. Conv.	82—87	...	...
70,000	10	9 Oct. '30	‡	10	Hongkong & China, Ltd. ...	11—12	...	...
213,200	Stk.	Feb. 29	6	6	Hornsey Con. 3½ p.c. ...	87—90	...	...
5,600,000	,,	Oct. 30	25	15	Imperial Continental Cap.	166—175	...	165—170
223,180	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb.	70—75	...	...
235,242	,,	Mar. 14	8⅓	8⅓	Lea Bridge 5 p.c. Ord. ...	131—136	...	...
2,145,907	,,	Feb. 29	6	6	Liverpool 5 p.c. Ord. ...	102—103[b]	+¼	...
245,500	,,	—	—	5	Do. 5 p.c. Red. Pref. ...	97—102[b]	...	...
306,083	,,	Jan. 15	4	4	Do. 4 p.c. Deb. ...	85—90[b]	...	...
165,736	,,	Feb. 15	8	10	Maidstone 5 p.c. Cap. ...	124—129	...	...
56,176	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	55—60	...	...
75,000	5	Nov. 30	110	110	Malta & Mediterranean ...	6½—7	...	...
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	77—82	...	...
171,978	Stk.	Feb. 29	5	5	M. S. D. Utility "C." Cons.	76—81	...	...
718,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	75—80	+5	75—77
112,126	,,	£	4	4	Do. 4 p.c. Deb. ...	77—82	...	...
148,955	,,	£	5	5	Do. 5 p.c. Deb. ...	97—102	...	...
675,000	,,	May 21	16	16	Montevideo, Ltd.	60—70	...	...
2,061,315	,,	Feb. 29	5	5⅓	Newcastle & Gateshead Con.	18/6—19/6[d]	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	75—76[d]	...	...
691,705	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	68—70[d]	...	...
277,285	,,	Oct. 30	5	5	Do. 5 p.c. Deb. '43...	95—97[d]	−2	...
199,940	,,	Mar. 14	7½	7½	North Middlesex 6 p.c. Con.	106—111	...	...
396,160	,,	Feb. 15	5	5	Northampton 5 p.c. max. ...	78—83	...	...
300,000	,,	Apl. 18	9	7	Oriental, Ltd.	85—95*	...	...
205,162	,,	Jan. 4	8	8	Plym'th & Stonehouse 5 p.c.	127—132	...	...
504,416	,,	Feb. 15	8	8	Portsm'th Con. Stk. 4 p.c. Std.	126—131	...	130
241,445	,,	,,	5	5	Do. 5 p.c. max. ...	78—83	...	...
114,000	,,	Feb. 15	5	5	Preston 5 p.c. Pref.	94—99	...	...
686,312	,,	Jan. 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	77—82	...	81½
389,818	,,	Jan. 4	4	4	Do. 4 p.c. Cons. Deb.	77—82	...	...
150,000	10	Apl. 4	6	6	San Paulo 6 p.c. Pref. ...	7—7½	...	...
1,736,968	Stk.	Apl. 4	6	6	Sheffield Cons.	101—103[e]	...	...
95,000	,,	Jan. 18	4	4	Do. 4 p.c. Deb.	79—81[e]	...	...
133,201	,,	Feb. 29	8⅓	5	Shrewsbury 5 p.c. Ord. ...	95—100	+7	95½—99
90,000	10	June 11	15	15	South African	3—5	...	...
6,709,895	Stk.	Feb. 15	5	7	South Met. Ord.	102—105	...	103—104
1,196,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	114—119	+1	117
1,895,445	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	63—66	...	...
1,000,000	,,	Jan. 18	4	5	Do. 5 p.c. Red. Deb.	100—104	...	...
91,500	,,	Feb. 29	8½	8½	South Shields Con.	125—127[d]	...	...
1,548,795	,,	Feb. 15	6½	6	South Suburban Ord. 5 p.c.	102—107	...	105—106½
300,000	,,	,,	5	5	Do. 5 p.c. Pref.	97—102	...	...
668,837	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	99—104	...	...
647,740	,,	Feb. 29	5	5	Southampt'n Ord. 5 p.c. max.	75—80	...	...
121,275	,,	,,	4	4	Do. 4 p.c. Deb.	77—82	...	...
250,000	,,	Aug. 24	7	7	Swansea 7 p.c. Red. Pref. ...	98—102	...	...
200,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	...	...
1,076,490	,,	Feb. 29	6⅔	6⅔	Tottenham and District Ord.	104—108	...	...
300,000	,,	,,	5⅓	5⅓	Do. 5⅓ p.c. Pref. ...	100—105	+7	...
199,005	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	77—82	...	...
85,701	,,	Apl. 4	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	70—75	...	...
346,069	,,	Feb. 29	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	100—105	...	103
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	90—95	...	94—95
1,329,220	,,	Feb. 29	7	7	Wandsworth and District: Consolidated	116—121	...	118
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	97—102	...	100—101
1,167,964	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	102—105	...	103½—105
158,400	,,	Feb. 29	5	6⅄	Winchester W.& G.5p.c.Con.	83—88	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g* The interest due 1/1/32 was paid on that date. *h* Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. =10 p.ct. p.a. less tax and less tax on interim dividend.

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Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

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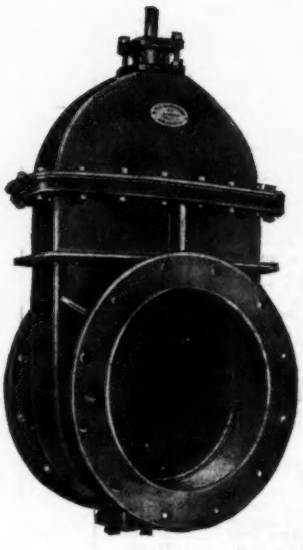

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CONTENTS

EDITORIAL NOTES.

A GLANCE AT THE CONTENTS . . . 371
A More Hopeful Situation 372
Good Showing of Gas Stocks 372
Some Recent Capital Issues 372
That Abused Word Economy 373
Opportunity for All 373
Co-operative Research in Australia . . . 373

Forthcoming Engagements 371
Personal 374

CORRESPONDENCE.

"400 B.Th.U.'s" 374

NEWS OF THE WEEK.

Paragraphs 375
Imperial Continental Gas Association . . 375
Institution of Gas Engineers 375
A Successful Exhibition 376
Coke Oven Gas Supply at Derby 376
National Gas Council—Meeting of the Central Executive Board 376
Prof. Wheeler and the Salerni Process . . 376
Gas Appliance Exhibition at Lingfield . . 376

NEWS OF THE WEEK—(*continued*).

Grantham Gas Company Seek Special Order 377
New Material for Air Conditioning . . . 377
N.S.W. Gas Legislation 377
New Glass-Smelting Furnace at Morley . . 377

SPECIAL ARTICLES, &c.

Ammonia and Benzole Recovery 378
National Gas Council of Great Britain and Ireland—
Fourteenth Annual Meeting 379
Sir David Milne-Watson's Address . . . 379
New Gas Showrooms at Oxted 382
The Gas Engine. By A. J. Cruise . . . 384
Staging an Accident—South Metropolitan Gas Company's First Aid Competition . 385
Coal Assays. By Harald Nielsen 386
Meter Testing in Birmingham 388

"JOURNAL" TECHNICAL RECORD.

North of England Gas Managers' Association—
Sales Policy of a Small Gas Undertaking. By J. Corrigan 389
London and Southern District Junior Gas Association—
Annual General Business Meeting . . . 392
Western Junior Gas Association—
Visit to the Trowbridge Works 393
Presidential Address of Mr. B. F. Harris . 393

"JOURNAL" TECHNICAL RECORD—(*continued*).

Notes on Plant and Processes 395
Midland Association of Gas Engineers and Managers—
Visit to the Nechells and Saltley Gas-Works 396
Luncheon 396
Midland Junior Gas Association—
General Business 397
Gas and Its Possibilities on the District. By S. W. Simmons, A.M.Inst.C.E. . . . 397

MISCELLANEOUS.

Gas Acts (1920 and 1929) Orders 377
Trade Notes 377
Bath Gas Special Order 399
Oakham Gas and Electricity Bill 400
New Capital Issues 401

GAS MARKETS AND MANUFACTURES.

Stock Market Report 402
Current Sales of Gas Products 402
Contracts Advertised To-Day 402

Stock and Share List 403

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For Advertisers' Index—see p. 408

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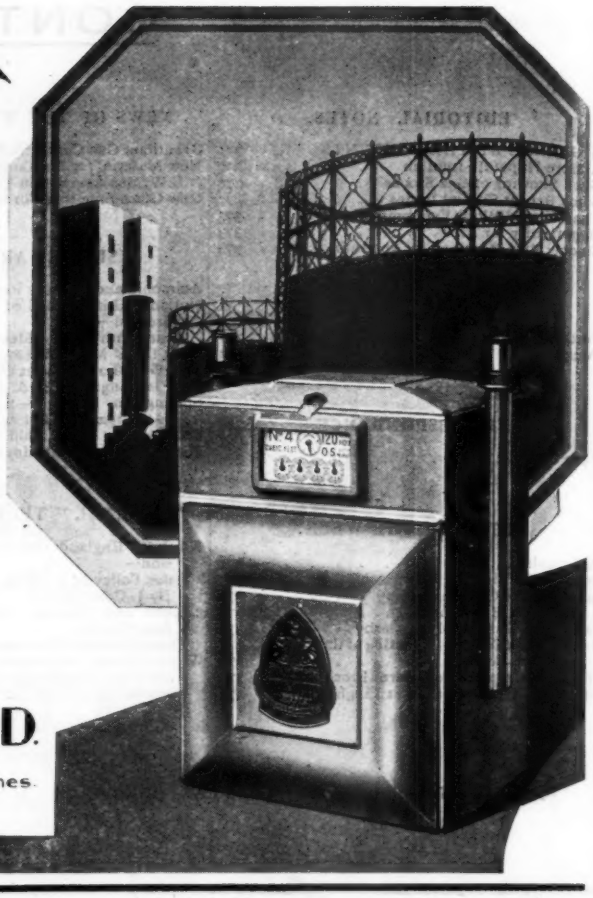

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